THE UNIVERSITY OF ALBERTA

AN ANALYSIS OF TRANSIENT GAS FLOW THROUGH POROUS MEDIA

by

EDWARD CHWYL

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE

DEGREE OF MASTER OF SCIENCE IN

PETROLEUM ENGINEERING

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DEPARTMENT OF CHEMICAL AND PETROLEUM ENGINEERING

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled AN ANALYSIS OF TRANSIENT GAS FLOW THROUGH POROUS MEDIA submitted by Edward Chwyl in partial fulfilment of the requirements for the degree of Master of Science in Petroleum Engineering.

ABSTRACT

It was initially thought that Darcy's law and the continuity equation satisfactorily described transient isothermal gas flow through homogeneous and isotropic porous media. In the process of development, however, it was realized that two distinct phenomena, previously neglected, affected such flow. These were the inertial and the molecular streaming effects.

Although previous attempts have been made to predict the effects of these phenomena on transient gas flow, no studies have been conducted where both effects have been considered simultaneously. In addition, solutions that account for either of these effects have generally been restricted to the case of a sealed external boundary and a constant mass producing rate.

In order to verify the existence of inertial effects, the Forchheimer equation was derived for the linear horizontal system and extended to include plane radial flow.

Existence of molecular streaming was justified by an extensive literature review on the subject.

A mathematical model which accounted for both the inertial and the molecular streaming effects was developed for the linear horizontal and the plane radial porous systems. The Crank-Nicholson Implicit procedure, in conjunction with a

function iteration scheme, was employed to solve the linear case. It proved to be both stable and convergent for the range of variables considered. Numerical computation was carried out on an IBM 360/67 digital computer for the following boundary conditions:

1. Constant terminal rate with constant pressure at the external boundary.
2. Constant terminal rate with a sealed external boundary.
3. Constant terminal pressure with a sealed external boundary.
4. Constant terminal pressure with constant pressure at the external boundary.

The results obtained indicated that the inertial resistance coefficient affected transient gas flow more adversely than did molecular streaming. However, both phenomena significantly affected the flow considered; therefore, neither effect may be neglected without some prior consideration to determine whether or not it is in fact insignificant.

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INTRODUCTION

Although considerable effort has been directed to the study of transient isothermal gas flow through porous media, the condition of this topic remains incomplete. The major difficulty arises from nonlinearity of the partial differential equations that describe such flow. Consequently the only solutions available are approximate ones - graphical solutions, analogue solutions, approximate analytical solutions, and numerical solutions.

Initially attempts were made to solve the nonlinear partial differential equation resulting from a combination of Darcy's law and the equation of continuity. In the process of development, however, it was realized that two distinct phenomena which were previously neglected significantly affected the physics of isothermal gas flow through porous media. These were the "inertial effects" and the "molecular streaming effects".

Ever since the importance of these two effects was realized, there have been many attempts to predict the results each phenomenon would have on fluid flow through porous systems. Recent studies[1,2] have verified the fact that both these phenomena are simultaneously important in steady state laboratory core testing.

It was the primary objective of this investigation to develop a workable mathematical model which would simul-

taneously incorporate these two phenomena and predict what effect they would have on transient isothermal gas flow through finite porous systems.

A secondary objective of this thesis was to validate the theory underlying visco-inertial gas flow and, to a lesser extent, molecular streaming. Hubbert[3] succeeded in deriving Darcy's law from the Navier-Stokes equation of motion. It was felt that a similar procedure could be extended to theoretically verify the validity of Forchheimer's equation. The importance of molecular streaming could be established by an extensive literature survey on the subject.

LITERATURE REVIEW

A. Viscous and Visco-Inertial Flow Equations

Hubbert[4] quotes Henry Darcy[5] to have experimentally established that the downward flow of water through sand filters was governed by the following equation:

$$q = -K \frac{(h_2 - h_1)}{H} \qquad (1)$$

This was subsequently called Darcy's law. Ever since this pioneer work, attempts have been made to theoretically derive Darcy's empirical equation and to employ variables with more general physical meaning. Numerous procedures had been followed, including capillary tube analogies, hydraulic radius theories, drag theories, turbulent flow analogies, and direct derivation from the Navier-Stokes equation of motion. In view of the extensive literature published on this subject, the following literature review has been limited to procedures involving derivations from the Navier-Stokes equation.

Using the Navier-Stokes equation of motion as a basis, Hubbert[6] derived Darcy's Law which was valid for any macroscopically homogeneous and isotropic porous medium. Treating viscosity as a constant and neglecting inertial forces, he integrated each term of the Navier-Stokes equation over the volume element, ΔV, and thus justified neglecting the divergence term $(\nabla \cdot \vec{v})$ for gas flow as well as liquid flow.

He concluded that Darcy's law describing gas flow was identical to that for a liquid "provided that the flow behavior of a gas in small pore spaces, other than expansion, is similar to that of a liquid". His final form of Darcy's law was

$$\vec{q} = \frac{N_s (d_c)^2 \rho}{\mu} (\vec{g} - \frac{1}{\rho} \text{grad } P) \tag{2}$$

Warren A. Hall[7] derived Darcy's law for an incompressible fluid flowing through anisotropic porous media. Also considering viscosity as a constant and inertial forces as negligible, he selected a volume element of fluid in the porous medium "which is small with respect to the gross dimensions of the system, yet large enough that the surface area of the matrix can be considered uniformly distributed throughout the element". He summed the body forces (pressure and gravity) and the surface forces (viscous) acting on this fluid element and obtained his version of Darcy's law.

$$\vec{q} = -(\frac{1}{\mu}) K \cdot (\nabla P + \rho \nabla gz) \tag{3}$$

where permeability, K, is considered to be a tensor, and (gz) is the potential of the gravitational force. When the medium is isotropic, permeability becomes a scalar quantity, in which case the dot product degenerates to a scalar product and Equation (3) may be rewritten as:

$$\vec{q} = - \frac{k}{\mu} (\nabla P + \rho \nabla gz) \tag{4}$$

S. Irmay[8] considered one-dimensional flow of an incompressible fluid through an homogeneous and isotropic medium. Employing statistical methods on the Navier-Stokes equation, he succeeded in obtaining an equation that described flow around spherical particles:

$$(J_h)_x = aq_x + bq_x^2 + c\hat{q}_x(t) \tag{5}$$

Through dimensional analogies the constants a, b, and c were estimated to be:

$$a = \frac{N_{s1}(1-\phi^2)\nu}{\phi^3 g(d_p)^2} \tag{6a}$$

$$b = \frac{N_{s2}(1-\phi)}{\phi^3 g(d_p)} \tag{6b}$$

$$c = \frac{1}{\phi g} \tag{6c}$$

Irmay stated that Polubarinova-Kochina (1952) showed the term, $cq_x(t)$, to be insignificant with respect to the other two terms. Equation (5) thus reduced to an equation consisting of two terms, as was suggested by Forchheimer[9].

$$(J_h)_x = aq_x + bq_x^2 \tag{7}$$

If, in addition, the quadratic term is neglected, a Darcy-type equation results. This is illustrated by Equation (8).

$$(J_h)_x = aq_x \tag{8}$$

S. Whitaker[10], using Cartesian coordinates and an integrating technique similar to that of Hubbert[11], derived Darcy's law for the flow of an incompressible fluid through an anisotropic but homogeneous porous medium. Introducing Euclidean shifters he was able to extend his derivation to general curvilinear coordinates, but for isotropic porous systems only. The generally valid form of Darcy's law as stated by Whitaker is:

$$\vec{q} = - \frac{k}{\mu} (\text{grad } P - \rho \vec{g}) \qquad (9)$$

Rowan and Clegg[12] credit Houpeurt (1959) with deriving a Forchheimer-type flow equation for an idealized porous system in which each channel was approximated by a series of truncated cones.

Except for these works of Irmay and Houpeurt, very little attention has been directed to the theoretical derivation of Forchheimer's equation. The alternate approach was to experimentally justify the existence of the quadratic term that is present in visco-inertial flow. The linear Forchheimer equation for horizontal flow may be written as:

$$- \frac{\partial P}{\partial x} = F_a \mu q_x + F_b \ \rho (q_x)^2 \qquad (10)$$

where $- \frac{\partial P}{\partial x}$ is a "macroscopic" pressure gradient in the direction of flow.

If the truncated form of Equation (10) is compared with the horizontal Darcy equation for linear flow, it becomes obvious that the viscous resistance coefficient, F_a, is equivalent to the inverse of the permeability.

Green and Duwez[13] conducted flow tests on a number of sintered cores and deduced that gas flow through these cores could be described by an equation idential to Equation (10). Both F_a and F_b were constants describing the porous medium and independent of the flowing fluid. Using the ideal gas law, the authors integrated Equation (10) over the length of the core sample and obtained the following equation:

$$\frac{-\Delta P^2}{L} = F_a \, \mu \left(\frac{2RT}{g_c M}\right) w_x + F_b \left(\frac{2RT}{g_c M}\right) w_x^2 \qquad (11)$$

where $F_a = \frac{1}{k}$.

Ergun[14] illustrated the validity of an expression similar to Equation (10) by showing that a plot of $\left(\frac{-\Delta P}{L} \frac{1}{(q_x)_{ave}}\right)$ vs. (ρq_x) yielded a straight line relationship. Therefore, he concluded that an equation similar to Equation (10) served as a satisfactory correlation for his empirical data.

After conducting flow tests on twenty-four samples of sandstones, limestones, and dolomites, Cornell and Katz[15] were able to conclude that the phenomenon of flow of the four gases that they used could best be described by an equation

identical to Equation (11).

Greenberg and Weger[16] conducted flow tests on samples of sintered metals and confirmed the results of Cornell and Katz. In addition, they showed that the term F_a was a strong function of temperature whereas the term F_b was in fact independent of temperature.

B. Phenomenon of Molecular Streaming

In data published by Fancher, Lewis, and Barnes in 1933, there was a consistent discrepancy between the permeability of oil sands to water and the permeability of oil sands to air. Prompted by this discrepancy, Klinkenberg[17] investigated the validity of the assumption that the permeability of a porous medium is independent of the nature of the fluid. In what is now considered the classical paper on molecular streaming of gases in petroleum reservoirs, Klinkenberg concluded that the permeability to a fluid was indeed a function of the nature of that fluid. He approximated the porous medium by a bundle of capillaries, one-third of which were oriented in each of the coordinate directions. By deriving a modified Poiseuille's equation which accounted for gas slippage in this model of the porous medium, and comparing the equation obtained with the integrated Darcy equation, Klinkenberg was able to conclude that the relationship between the apparent permeability to a gas and the absolute

(liquid) permeability was

$$k_a = k(1 + \frac{4c_1 \lambda_{ave}}{r_c}) \qquad (12)$$

He reasoned that because the mean free path, λ_{ave}, is an inverse function of the mean pressure, Equation (12) could be rewritten as

$$k_a = k(1 + \frac{b}{P_M}) \qquad (13)$$

where b is a lumped constant and is a characteristic of the porous medium and the particular flowing gas. Klinkenberg then experimentally demonstrated that Equation (13) was applicable to porous media in general.

Calhoun and Yuster[18] and Rose[19] concluded that the apparent permeability of a given porous medium to different gases is equivalent if the temperature is such that the mean free paths of the different gas molecules is equivalent. This, in essence, is a restatement of Equation (12) which states that the apparent permeability to a gas is directly proportional to the mean free path of that gas. Rose derived an expression which predicted the mean free path length at any mean pressure and temperature:

$$\lambda_{ave} \simeq 2.13 \frac{\mu}{P_M} \sqrt{RT/M} \qquad (14)$$

Collins and Crawford[20] were among the first to incorporate the Klinkenberg slippage correction term into an equation describing transient gas flow. They modified

Darcy's law for horizontal gas flow, Equation (15), by substituting the Klinkenberg correction term for the apparent permeability. The result was Equation (16).

$$\vec{q} = -\frac{k_a}{\mu} \text{ grad } P \tag{15}$$

$$\vec{q} = -\frac{k}{\mu}\left(\frac{P+b}{P}\right) \text{ grad } P \tag{16}$$

When they combined Equation (16) with the continuity equation and the ideal gas law, they obtained the following partial differential equation:

$$\nabla^2 (P+b)^2 = \frac{2\mu\phi}{k} \frac{\partial (P+b)}{\partial t} \tag{17}$$

The authors then instituted a change of the dependent variables by setting P* equal to (P+b), and obtained a partial differential equation identical in form to one in which the slippage correction term was not accounted for. This equation was

$$\nabla^2 (P^*)^2 = \frac{2\mu\phi}{k} \frac{\partial (P^*)}{\partial t} \tag{18}$$

They therefore concluded that the solution to Equation (18) would be the same as the solution to the Darcy-Continuity equation, provided that the dependent variable was redefined in the manner specified.

Stewart and Owens[21] experimentally demonstrated the reduction of gas slippage with increasing inertial effects. Plug flow was characterized by the complete disappearance of

the slippage phenomenon. The apparent permeability for plug flow was therefore independent of the mean flowing pressure of the gas and dependent solely on the Reynold's number.

C. Solutions to Transient Isothermal Gas Flow Equations

Various forms of the partial differential equation describing transient gas flow through porous media have been solved by different approximate procedures. Discussion, however, will be restricted to the semi-analytical methods and the numerical methods. The cases treated are for isothermal horizontal flow of gases exhibiting constant viscosity and gas compressibility, unless otherwise specified. The porous media considered are homogeneous and isotropic.

The basic partial differential equation describing horizontal transient Darcy-type flow of ideal gases through porous media, as stated by Bruce et al[22] is

$$\nabla^2 P^2 = \frac{2\phi\mu}{k}\frac{\partial P}{\partial t} \tag{19}$$

For flow in the x-direction, Equation (19) becomes

$$\frac{\partial^2 P^2}{\partial x^2} = \frac{2\phi\mu}{k}\frac{\partial P}{\partial t} \tag{20}$$

For plane radial flow, Equation (19) becomes

$$\frac{\partial^2 P^2}{\partial r^2} + \frac{1}{r}\frac{\partial P^2}{\partial r} = \frac{2\phi\mu}{k}\frac{\partial P}{\partial t} \tag{21}$$

The authors numerically solved Equations (20) and (21) for the case of a constant production flow rate of an ideal gas from a reservoir with a sealed external boundary. They employed both the Forward Difference Explicit and the Crank-Nicholson Implicit procedures. (For a discussion of these finite difference procedures, refer to Lapidus[23].) The solutions, presented in graphical form for various values of dimensionless parameters, were compared with a laboratory study of gas depletion in a linear system having the same boundary conditions.

Jenkins and Aronofsky[24] presented a numerical technique for solving a radial system identical to that of Bruce et al. They redefined the independent variable as $\xi = \ln \bar{r}$, and used the Forward Difference Explicit procedure to solve for pressures at all the grid points except near the wellbore. At the wellbore they employed a "steady state core approximation" in order to avoid excessive computer time.

Aronofsky and Porter[25] extended the above procedure to include a real gas with varying viscosity and gas compressibility. The partial differential equation that they obtained to describe such flow was the following:

$$\nabla \cdot \left(\rho \frac{k}{\mu} \nabla P\right) = \phi \frac{\partial \rho}{\partial t} \tag{22}$$

where

$$\mu = (c_2P + c_3)$$

$$z = (1 - c_4P)$$

$$\rho = \frac{\rho_s z_s}{P_s} \frac{P}{z}$$

The terms c_2, c_3, and c_4 are constants which characterize the gas flowing through the porous system.

The equation that they solved was the expanded radial form of Equation (22), namely:

$$F_1(\overline{P}) \frac{\partial^2 \overline{P}}{\partial \xi^2} + F_2(\overline{P}) \frac{\partial^2 \overline{P}^2}{\partial \xi^2} = F_3(\overline{P})\, r_w^{\,2} e^{2\xi} \frac{\partial \overline{P}}{\partial t} \qquad (23)$$

where $F_1(\overline{P})$, $F_2(\overline{P})$, and $F_3(\overline{P})$ are functions of the characteristic values of the real gas at the flowing pressure of the system.

The first attempt to solve an equation describing transient gas flow corrected for molecular streaming was made by Aronofsky[26]. He utilized Darcy's law, the equation of continuity, the ideal gas law, and the Klinkenberg slippage correction term to obtain the following partial differential equation:

$$\nabla \cdot \left[(P+b)\nabla P \right] = \frac{\phi\mu}{k} \frac{\partial P}{\partial t} \qquad (24)$$

He then solved Equation (24) for the constant terminal pressure case with a sealed external boundary by using the Forward

Difference Explicit procedure. This work was later examined experimentally by Wallick and Aronofsky[27]. The experimental work showed excellent agreement with the theoretical predictions except for the initial transient period where flow rates were the highest and inertial effects were the most significant.

Kidder[28] presented an analytical solution to the problem of transient flow of a gas through one-dimensional semi-infinite porous media with a constant pressure at the producing face. He employed a perturbation technique (carried out to include second-order terms) and obtained a solution to the following partial differential equation:

$$\frac{\partial}{\partial x}\left(P\frac{\partial P}{\partial x}\right) = \frac{\phi\mu}{k}\frac{\partial P}{\partial t} \tag{25}$$

Al-Hussainy et al[29] considered the effect of a pressure dependent viscosity and compressibility factor on Darcy-type flow of real gases through porous media. By eliminating density from Equation (22),the authors obtained the equation

$$\nabla\cdot\left[\frac{P}{\mu(P)z(P)}\nabla P\right] = \frac{\phi}{k}\frac{\partial}{\partial t}\left(\frac{P}{z(P)}\right) \tag{26}$$

The above equation was transformed into a form similar to the diffusivity equation, but in addition it relaxed the assumption that pressure gradients were small. The result was the

following diffusivity-type equation:

$$\nabla^2 m(P) = \frac{\phi\mu(P)c_g(P)}{k}\frac{\partial m(P)}{\partial t} \tag{27}$$

where

$$m(P) = 2\int_{P_s}^{P} \frac{P}{\mu(P)z(P)}\,dP$$

$$c(g) = \frac{1}{\rho}\frac{d\rho}{dP}$$

In the radial system, Equation (27) becomes:

$$\frac{\partial^2 m(P)}{\partial r^2} + \frac{1}{r}\frac{\partial m(P)}{\partial r} = \frac{\phi\mu(P)c_g(P)}{k}\frac{\partial m(P)}{\partial t} \tag{28}$$

The authors concluded that the solutions obtained to Equation (28) in terms of the pseudo-pressure drop, m(P), were analagous to the solutions that van Everdingen and Hurst[30] obtained to a similar equation, but with a dimensionless pressure drop as the dependent variable.

Tek et al[31] combined the radial Forchheimer equation, which was similar to Equation (29), with the radial continuity equation, and numerically solved the resulting partial differential equation using the Backward Difference Implicit procedure.

$$-\frac{\partial P^2}{\partial r} = \frac{2}{c_o}\left[\frac{\mu}{k}(\rho q_r) + F_b(\rho q_r)^2\right] \tag{29}$$

The solutions were restricted to the case of a constant

terminal production rate and a sealed external boundary. By varying the inertial coefficient the authors were able to study its effect on wellbore pressures, drainage radii, and isochronal testing.

Swift and Kiel[32] numerically and semi-analytically solved the partial differential equation resulting from a combination of the radial Forchheimer equation with the radial continuity equation. By introducing a correction term, $\delta(r,Q)$, to compensate for non-Darcy flow, they were able to obtain a partial differential equation very similar to one describing Darcy flow, namely:

$$\frac{\partial}{\partial \xi}\left[\delta(\xi,Q)\,\frac{\partial \overline{P}^2}{\partial \xi}\right] = e^{2\xi}\,\frac{\partial \overline{P}}{\partial \Theta} \qquad (30)$$

where

$$\Theta = \left(\frac{kP_f}{2r_e^{\,2}\mu\phi}\right) t$$

$$\xi = \ln \overline{r}$$

Equation (30) was solved by a numerical technique similar to the one employed by Bruce et al[33], for a reservoir with a constant producing rate and a sealed external boundary. The authors expressed the Forchheimer equation as:

$$-\frac{\partial P}{\partial r} = \frac{\mu}{k}\, q_r \left(\frac{1}{\delta(r,Q)}\right) \qquad (31)$$

Rowan and Clegg[34] semi-analytically solved Forchheimer-type radial gas flow through bounded and infinite reservoirs producing at both constant rates and constant pressures. They employed a radius of disturbance which "moved outward from the wellbore and was such that beyond it the formation was undisturbed". Because a mean value for $(\partial P/\partial t)$ within this zone of disturbance was used, the Forchheimer and the continuity equations could be rewritten as ordinary differential equations and therefore integrated between the appropriate limits. The semi-analytical solutions were compared with published results for quadratic flow obtained on digital and analogue computers. This procedure was essentially an extension of an earlier work by Rowan and Clegg[35] where they considered Darcy-type flow in radial porous systems.

THEORY

Isothermal laminar flow of a Newtonian fluid through any continuous flow channel can be described by the microscopic Navier-Stokes equation of motion, which is rigorously derived by Bird, Stewart, and Lightfoot[36]. The equation can be written in vector notation, on a per volume basis, as:

$$\left[\vec{g} - \frac{1}{\rho}\,\text{grad}\ P\right] = \frac{D\vec{v}}{Dt} - \frac{\mu}{\rho}\left[\nabla^2\vec{v} + \frac{1}{3}\,\nabla(\nabla\cdot v)\right] \qquad (32)$$

Since complete geometrical characterization of a porous medium has not yet been accomplished, it is most difficult to accurately describe flow through a porous system. Geometrical parameters of a porous medium are based on volumetric averages and, as a result, average flow values should be employed to describe the physics of flow through a porous system. Thus, an acceptable procedure would be to integrate the microscopic variables in the Navier-Stokes equation over some macroscopic volume element. Ideally, this element should be large enough so that the average quantities thus obtained generally describe the porous medium and the flow through it, and yet small enough so that the flow equations can still be considered continuous. Microscopic quantities would therefore be converted into measurable macroscopic quantities. These two frames of reference are best described

by Hubbert[37]. He states that the macroscopic scale "is large as compared with the grain or pore size of the porous solid and the flow of a fluid through a porous solid is seen as a continuous phenomenon in space". The microscopic scale, on the contrary, is "commensurate with the grain or pore size of the solid, but still large as compared with the molecular dimensions or motional irregularities due to Brownian or molecular movements."

For the sake of brevity, the remaining theory has been confined to the horizontal linear and the plane radial geometries, which are illustrated by Figures 1 and 2 respectively. In particular the significance of inertial effects and molecular streaming effects are considered.

A. Linear System

For linear flow in the x-direction, Equation (32) can be written as:

$$\left(g_x - \frac{1}{\rho}\frac{\partial P}{\partial x}\right) = \frac{\partial v_x}{\partial t} + \left(v_x \frac{\partial v_x}{\partial x} + v_y \frac{\partial v_x}{\partial y} + v_z \frac{\partial v_x}{\partial z}\right)$$

$$- \frac{\mu}{\rho}\left[\left(\frac{\partial^2 v_x}{\partial x^2} + \frac{\partial^2 v_x}{\partial y^2} + \frac{\partial^2 v_x}{\partial z^2}\right) + \frac{1}{3}\frac{\partial}{\partial x}\left(\frac{\partial v_x}{\partial x} + \frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z}\right)\right] \qquad (33)$$

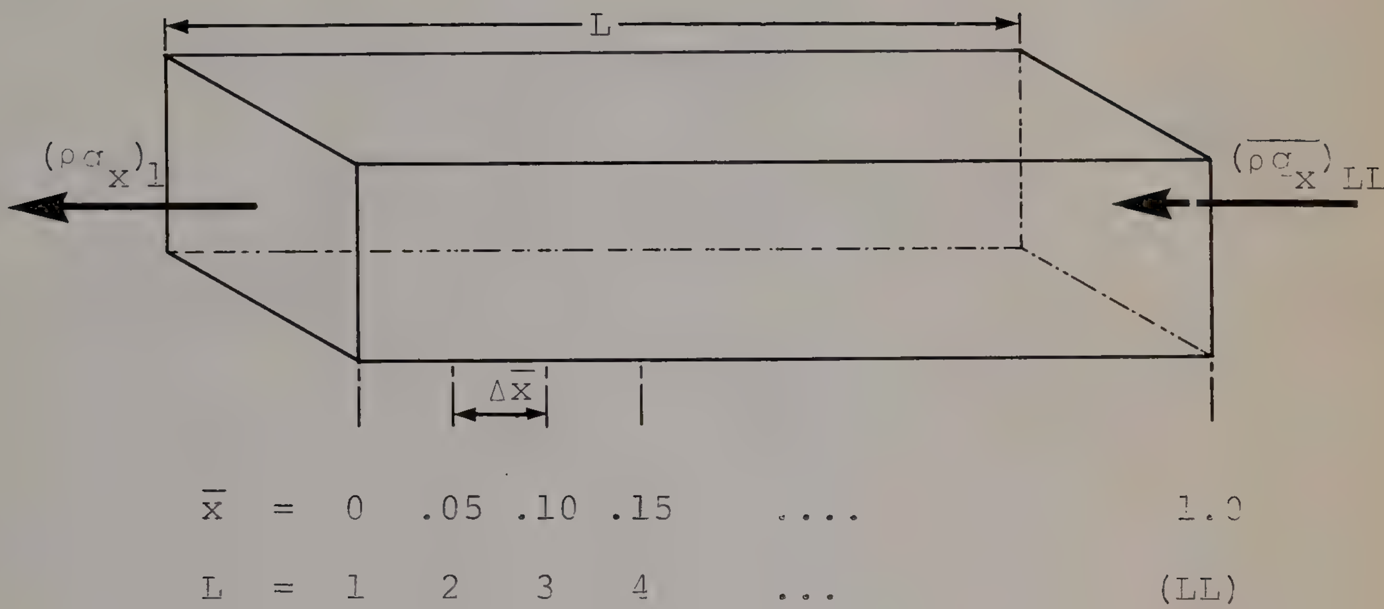
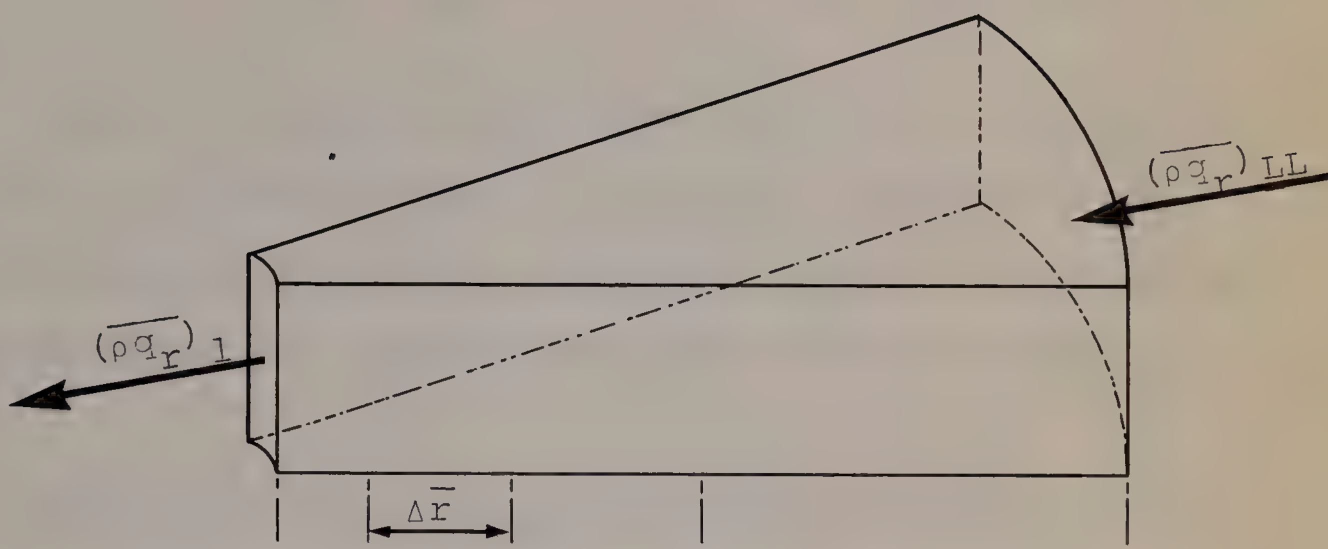


Figure 1. Linear Geometry ($\Delta\bar{x}$ = 0.05)



$\bar{r}$	=	1.0	1.28	1.65	2.13	...	$\bar{r}_e$
ξ	=	0	0.25	0.50	0.75		ξ_e
L	=	1	2	3	4		(LL)

Figure 2. Radial Geometry ($\Delta\xi = 0.25$)

If flow is further assumed to be horizontal and steady, Equation (33) becomes:

$$-\frac{1}{\rho}\frac{\partial P}{\partial x} = (v_x \frac{\partial v_x}{\partial x} + v_y \frac{\partial v_x}{\partial y} + v_z \frac{\partial v_x}{\partial z}) - \frac{\mu}{\rho}\left[(\frac{\partial^2 v_x}{\partial x^2} + \frac{\partial^2 v_x}{\partial y^2} + \frac{\partial^2 v_x}{\partial z^2}) + \frac{1}{3}\frac{\partial}{\partial x}(\frac{\partial v_x}{\partial x} + \frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z})\right] \tag{34}$$

Since the Forchheimer equation is valid for steady state flow which accounts for viscous and inertial effects, it appears reasonable that it could be obtained from Equation (34), which describes similar flow but on the microscopic scale.

This can in fact be accomplished, as indicated in Appendix A, by applying an appropriate integration scheme to Equation (34). This procedure yields the linear form of the Forchheimer equation, namely:

$$-\frac{\partial P}{\partial x} = F_a \mu q_x + F_b \rho q_x |q_x| \tag{35}$$

where $(\partial P/\partial x)$ is the macroscopic pressure gradient.

If this equation is multiplied through by density and then density is eliminated from the left hand side by employing the equation of state,

$$\rho = c_o P \tag{36}$$

where $$c_o = \frac{M}{Z_{ave} RT}$$

a more workable form results, viz.,

$$-\frac{\partial P^2}{\partial x} = \frac{2}{c_o}\left[\frac{\mu}{k_a}(\rho q_x) + F_b(\rho q_x)|\rho q_x|\right] \qquad (37)$$

where $$\frac{1}{k_a} = F_a$$

Since the term k_a in this equation denotes the apparent permeability, which is a function of the flowing pressure and the geometry of the porous structure, it is appropriate to substitute for it by means of the following equation:

$$k_a = k(1 + \frac{b}{P}) \qquad (38)$$

When this substitution is made a modified Forchheimer equation, which accounts for the molecular streaming of gases, results:

$$-\frac{\partial P^2}{\partial x} = \frac{2}{c_o}\left[\frac{\mu}{k}(\frac{P}{P+b})(\rho q_x) + F_b(\rho q_x)|\rho q_x|\right] \qquad (39)$$

To describe transient gas flow, the above flow equation must be coupled with an appropriate equation of continuity, namely:

$$\frac{\partial}{\partial x}(\rho q_x) = -\frac{c_o\phi}{2P}\frac{\partial P^2}{\partial t} \qquad (40)$$

The equation of continuity is valid for all times whereas the modified Forchheimer equation, which describes steady state flow, is valid at any particular instant of

time. A combination of the two equations will therefore amount to a series of steady state approximations to the transient flow problem. Once Equation (39) and (40) are coupled with an appropriate set of boundary conditions, then linear, horizontal, isothermal, transient flow of gases is fully described.

In order to make the approach general for a wide range of physical properties and flow conditions, the modified Forchheimer equation and the equation of continuity may be rewritten in terms of dimensionless parameters as:

$$-\frac{\partial \overline{P}^2}{\partial \overline{x}} = 2\left(\frac{\overline{P}}{\overline{P}+\overline{b}}\right)(\overline{\rho q_x}) + 4\overline{B}(\overline{\rho q_x})\left|\overline{\rho q_x}\right| \tag{41}$$

and

$$\frac{\partial}{\partial \overline{x}}(\overline{\rho q_x}) = -\frac{1}{2\overline{P}}\frac{\partial \overline{P}^2}{\partial t_D} \tag{42}$$

If these two equations are combined according to a procedure outlined in Appendix B, a second-order nonlinear partial differential equation results which may be written in the following manner:

$$C(u,u_{\overline{x}})\, u_{\overline{xx}} + D(u,u_{\overline{x}})\, u_{\overline{x}} = u_{t_D} \tag{43}$$

where

$$u = \overline{P}^2$$

$$C(u,u_{\overline{x}}) = \frac{\overline{P}(\overline{P}+\overline{b})}{\overline{P} + 4\overline{B}(\overline{P}+\overline{b})\left|\overline{\rho q_x}\right|}$$

$$D(u,u_{\overline{x}}) = \frac{\overline{b}(\overline{\rho q_x})}{(\overline{P}+\overline{b})\left[\overline{P} + 4\overline{B}(\overline{P}+\overline{b})\left|\overline{\rho q_x}\right|\right]}$$

The dimensionless flow rate per unit area, $\overline{\rho q_x}$, appears in both these nonlinear terms and is related to the dimensionless pressure distribution by Equation (41).

To completely describe transient horizontal linear gas flow through a porous system, Equations (43) and (41) must be coupled with an appropriate set of boundary conditions. The four most common sets of boundary conditions for a finite linear porous system are summarized in Table 1.

B. Radial System

The Forchheimer equation for plane radial flow may be expressed as:

$$-\frac{\partial P^2}{\partial r} = \frac{2}{c_o}\left[\frac{\mu}{k_a}(\rho q_r) + F_b(\rho q_r)|\rho q_r|\right] \qquad (44)$$

This equation, which was developed in Appendix A, is identical to the linear Forchheimer equation except that the independent variable (x) is replaced by (r).

If Klinkenberg's slippage correction term is introduced into Equation (44), a radial Forchheimer equation corrected for molecular streaming results. This equation can be written as:

$$-\frac{\partial P^2}{\partial r} = \frac{2}{c_o}\left[\frac{\mu}{k}\left(\frac{P}{P+b}\right)(\rho q_r) + F_b(\rho q_r)|\rho q_r|\right] \qquad (45)$$

Table 1

Summary of Boundary Conditions for the Linear System

Description	Case I	Case II	Case III	Case IV
Initial Condition	$P(x,0)=P_f$ $\overline{P}(\overline{x},0)=1.0$	$P(x,0)=P_f$ $\overline{P}(\overline{x},0)=1.0$	$P(x,0)=P_f$ $\overline{P}(\overline{x},0)=1.0$	$P(x,0)=P_f$ $\overline{P}(\overline{x},0)=1.0$
Boundary Condition at Producing End	$\rho q_x(0,t)=c_w$ $\overline{\rho q_x}(0,t_D)=\overline{c}_w$	$\rho q_x(0,t)=c_w$ $\overline{\rho q_x}(0,t_D)=\overline{c}_w$	$P(0,t)=P_w$ $\overline{P}(0,t_D)=\overline{P}_w$	$P(0,t)=P_w$ $\overline{P}(0,t_D)=\overline{P}_w$
Boundary Condition at External End	$P(L,t)=P_f$ $\overline{P}(1,t_D)=1.0$	$\rho q_x(L,t)=0$ $\overline{\rho q_x}(1,t_D)=0$	$\rho q_x(L,t)=0$ $\overline{\rho q_x}(1,t_D)=0$	$P(L,t)=P_f$ $\overline{P}(1,t_D)=1.0$

Case I. Constant terminal rate with constant pressure at the external boundary.

Case II. Constant terminal rate with a sealed external boundary.

Case III. Constant terminal pressure with a sealed external boundary.

Case IV. Constant terminal pressure with constant pressure at the external boundary.

Also needed to describe transient flow behavior is the radial equation of continuity, namely:

$$\frac{1}{r}\frac{\partial}{\partial r}\left[r(\rho q_r)\right] = -\phi\frac{\partial \rho}{\partial t} .$$

$$= -\frac{c_o\phi}{2P}\frac{\partial P^2}{\partial t} \qquad (46)$$

Introducing dimensionless parameters into Equations (45) and (46), they may be rewritten as

$$-\frac{\partial \overline{P}^2}{\partial \overline{r}} = 2\left(\frac{\overline{P}}{\overline{P}+\overline{b}}\right)(\overline{\rho q_r}) + 4\overline{B}(\overline{\rho q_r})\left|\overline{\rho q_r}\right| \qquad (47)$$

and

$$\frac{1}{\overline{r}}\frac{\partial}{\partial \overline{r}}\left[\overline{r}(\overline{\rho q_r})\right] = -\frac{1}{2\overline{P}}\frac{\partial \overline{P}^2}{\partial t_D} \qquad (48)$$

Equations (47) and (48) may be combined according to the procedure outlined in Appendix B, the result being the following second-order nonlinear partial differential equation:

$$C(u,u_{\overline{r}})u_{\overline{rr}} + D(u,u_{\overline{r}})u_{\overline{r}} + E(u,u_{\overline{r}}) = u_{t_D} \qquad (49)$$

where

$$u = \overline{P}^2$$

$$C(u,u_{\overline{r}}) = \frac{\overline{P}(\overline{P}+\overline{b})}{\overline{P} + 4\overline{B}(\overline{P}+\overline{b})\left|\overline{\rho q_r}\right|}$$

$$D(u,u_{\overline{r}}) = \frac{\overline{b}(\overline{\rho q_r})}{(\overline{P}+\overline{b})\left[\overline{P} + 4\overline{B}(\overline{P}+\overline{b})\left|\overline{\rho q_r}\right|\right]}$$

$$E(u,u_{\overline{r}}) = \frac{-2\overline{P}(\overline{\rho q_r})}{\overline{r}}$$

In order to permit closely spaced increments near the wellbore and still retain equally spaced increments of the space variable, the transformation, $\xi = \ln \bar{r}$, may be employed. Under this transformation Equation (49) becomes:

$$C(u,u_\xi)u_{\xi\xi} + D(u,u_\xi)u_\xi + E(u,u_\xi) = u_{t_D} \tag{50}$$

where

$$u = \bar{P}^2$$

$$C(u,u_\xi) = \frac{\bar{P}(\bar{P}+\bar{b})e^{-2\xi}}{\bar{P} + 4\bar{B}(\bar{P}+\bar{b})|\overline{\rho q_\xi}|}$$

$$D(u,u_\xi) = \frac{\bar{b}(\overline{\rho q_\xi})e^{-\xi} - \bar{P}(P+b)^2 e^{-2\xi}}{(\bar{P}+\bar{b})\left[\bar{P} + 4\bar{B}(\bar{P}+\bar{b})|\overline{\rho q_\xi}|\right]}$$

$$E(u,u_\xi) = 2\bar{P}e^{-\xi}(\overline{\rho q_\xi})$$

The dimensionless flow rate per unit area, $(\overline{\rho q_\xi})$, once again appears in all the nonlinear terms. It must be related to the dimensionless pressure distribution by the Forchheimer equation rewritten in terms of the new space variable. This equation may be expressed as:

$$-\frac{\partial \bar{P}^2}{\partial \xi} = \frac{2\bar{P}(\overline{\rho q_\xi})e^{\xi}}{(\bar{P}+\bar{b})} + 4\bar{B}(\overline{\rho q_\xi})|\overline{\rho q_\xi}|e^{\xi} \tag{51}$$

To completely describe plane radial transient gas flow through a porous system, Equations (50) and (51) must be accompanied by an appropriate set of boundary conditions.

The four most common sets of boundary conditions for a finite radial porous system are summarized in Table 2.

Table 2

Summary of Boundary Conditions for the Radial System

Description	Case I	Case II	Case III	Case IV
Initial Condition	$P(r,0)=P_f$ $\overline{P}(\overline{r},0)=1.0$ $\overline{P}(\xi,0)=1.0$	$P(r,0)=P_f$ $\overline{P}(\overline{r},0)=1.0$ $\overline{P}(\xi,0)=1.0$	$P(r,0)=P_f$ $\overline{P}(\overline{r},0)=1.0$ $\overline{P}(\xi,0)=1.0$	$P(r,0)=P_f$ $\overline{P}(\overline{r},0)=1.0$ $\overline{P}(\xi,0)=1.0$
Boundary Condition at the Wellbore	$\rho q_r(r_w,t)=c_w$ $\overline{\rho q_r}(1,t_D)=\overline{c}_w$ $\overline{\rho q_\xi}(0,t_D)=\overline{c}_w$	$\rho q_r(r_w,t)=c_w$ $\overline{\rho q_r}(1,t_D)=\overline{c}_w$ $\overline{\rho q_\xi}(0,t_D)=\overline{c}_w$	$P(r_w,t)=P_w$ $\overline{P}(1,t_D)=1.0$ $\overline{P}(0,t_D)=1.0$	$P(r_w,t)=P_w$ $\overline{P}(1,t_D)=1.0$ $\overline{P}(0,t_D)=1.0$
Boundary Condition at the External Boundary	$P(r_e,t)=P_f$ $\overline{P}(\overline{r}_e,t_D)=1.0$ $\overline{P}(\xi_e,t_D)=1.0$	$\rho q_r(r_e,t)=0$ $\overline{\rho q_r}(\overline{r}_e,t_D)=0$ $\overline{\rho q_\xi}(\xi_e,t_D)=0$	$\rho q_r(r_e,t)=0$ $\overline{\rho q_r}(\overline{r}_e,t_D)=0$ $\overline{\rho q_\xi}(\xi_e,t_D)=0$	$P(r_e,t)=P_f$ $\overline{P}(\overline{r}_e,t_D)=1.0$ $\overline{P}(\xi_e,t_D)=1.0$

Case I. Constant terminal rate with constant pressure at the external boundary.

Case II. Constant terminal rate with a sealed external boundary.

Case III. Constant terminal pressure with a sealed external boundary.

Case IV. Constant terminal pressure with constant pressure at the external boundary.

SOLVING THE MATHEMATICAL MODEL

If it is conceded that Equations (43) and (41) and Equations (50) and (51), along with an appropriate set of boundary conditions, satisfactorily describe the flow of gases in their respective porous systems, the task remains to obtain reasonable solutions to these formulated equations. The main objective of such solutions is to predict the effect that the dimensionless slip and inertial resistance coefficients exhibit on transient gas flow through finite porous media.

A. The Procedure Employed

Equations (43) and (50) can be classified as second-order, nonlinear, parabolic-type partial differential equations. Primarily because of their nonlinearity, these equations do not lend themselves to analytical solution and consequently must be solved by means of a numerical technique. The technique must be stable and it must converge to solutions that can be considered correct. Since it is necessary to couple Equations (43) and (50) with Equations (41) and (51), respectively, the complexity of the problem increases.

Ames[38] classifies finite difference approximation procedures as either explicit or implicit. Explicit procedures yield solutions directly in terms of known quantities, but stability problems arise if the mesh size ratio is not

properly chosen. Implicit procedures involve increased computational complexity but overcome this stability problem. In order to minimize problems of stability, implicit procedures were favored in general and the Crank-Nicholson procedure was chosen in particular. Specifically, the following discrete approximations were employed in the numerical technique:

1. A second-order correct central difference approximation on the space derivatives in the partial differential equation.
2. A second-order correct central difference approximation on all Neumann boundary conditions.
3. A third-order correct approximation on the space derivative in the Forchheimer equation.

These finite difference approximations yielded a system of nonlinear algebraic equations which may be written in matrix notation as

$$[M]_{(m+\frac{1}{2})} \circ (\vec{u})_{(m+1)} = (\vec{a})_m \tag{52}$$

The square root inversion technique, modified to accommodate nonsymmetric matrices, was employed to invert the matrix. The solution vector was then obtained according to Equation (53)

$$(\vec{u})_{m+1} = [M]^{-1}_{(m+\frac{1}{2})} \circ (\vec{a})_m \tag{53}$$

From the values of the pressures thus obtained, the flow rates at time level (m+1) were evaluated. As a result, the non-linear terms could also be calculated.

In order to ensure that the flow rates and the pressure distributions agreed within a reasonable degree of accuracy, a material balance was performed for each boundary condition.

The computational scheme employed can best be illustrated by means of a general flow diagram as shown in Figure 3. A detailed copy of the computer program for the second set of boundary conditions is presented in Appendix E.

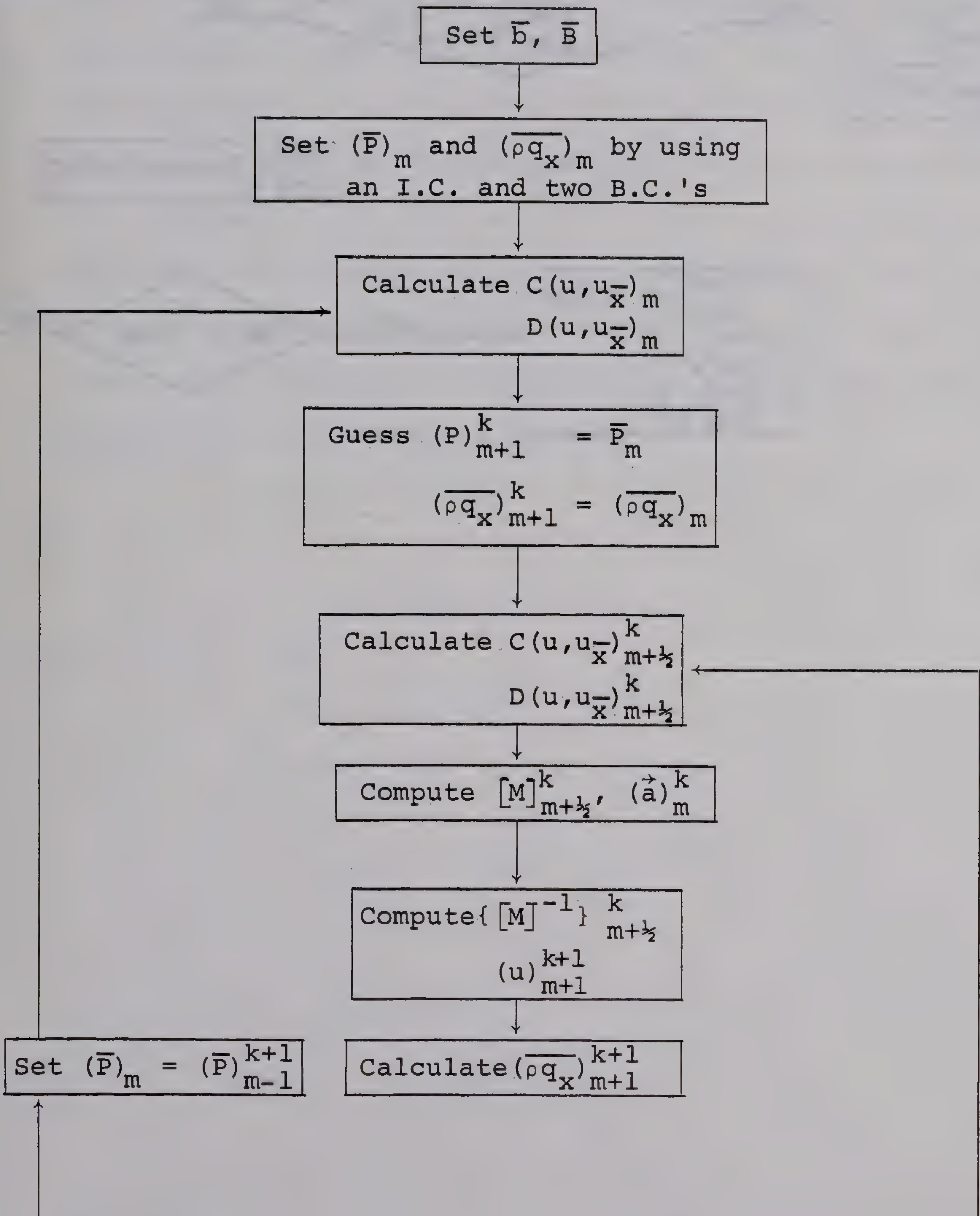
B. Stability and Convergence

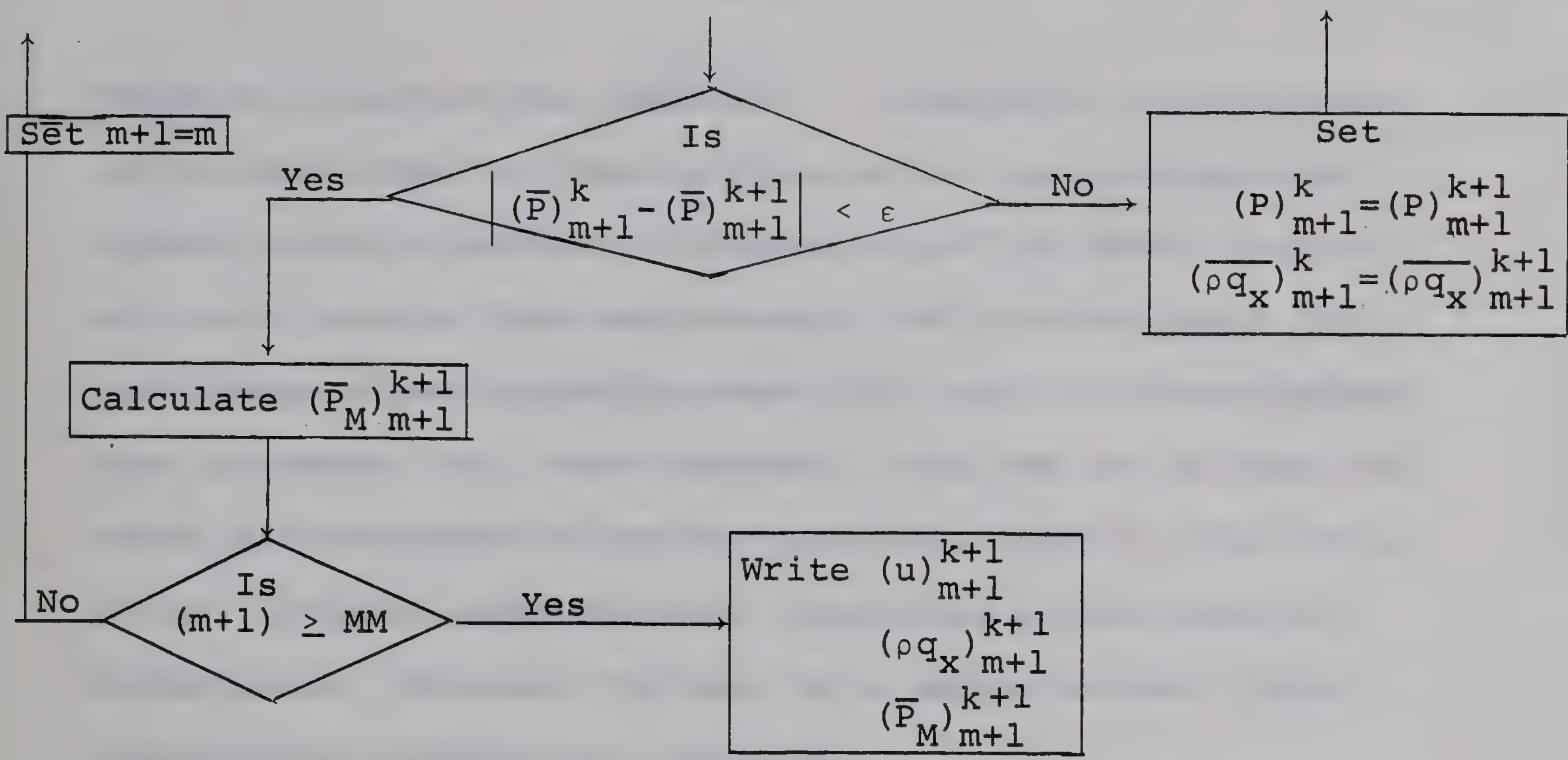
As has been previously stated, the numerical procedure must first of all be stable, and secondly, it must yield a solution that is "reasonably close" to the exact solution of this system of equations.

A numerical procedure can be termed "stable" if an error introduced at the outset of an iteration scheme does not magnify itself as iteration continues. Instability problems, which would have eventually swamped the true solution, were not encountered in the numerical technique employed.

Normally a numerical solution can be termed "convergent" if it approaches the exact solution as the grid spacing approaches zero. Since the exact solution to the problem in question cannot be deduced, a different con-

Figure 3. General Flow Diagram




Set m+1=m
Yes
Is
$\left| (\bar{P})^{k}_{m+1} - (\bar{P})^{k+1}_{m+1} \right| < \varepsilon$
No
Set
$(P)^{k}_{m+1} = (P)^{k+1}_{m+1}$
$(\overline{\rho q_x})^{k}_{m+1} = (\overline{\rho q_x})^{k+1}_{m+1}$
Calculate $(\bar{P}_M)^{k+1}_{m+1}$
No
Is
$(m+1) \geq MM$
Yes
Write $(u)^{k+1}_{m+1}$
$(\rho q_x)^{k+1}_{m+1}$
$(\bar{P}_M)^{k+1}_{m+1}$

vergence criterion was necessary. Consequently convergence was assumed when the results obtained at one grid spacing agreed within a certain "allowable error" to those obtained at a grid spacing that was one-half the previous one. Both the dimensionless space increment ($\Delta\bar{x}$) and the dimensionless time increment (Δt_D) were checked. This was not an absolute check on convergence since the numerical results could still differ from the exact solution depending on the rate of convergence. However, for want of a better method, this convergence criterion was employed.

RESULTS

The Forchheimer equation describing linear, horizontal, steady gas flow was derived from the Navier-Stokes equation of motion by employing a procedure similar to that of Hubbert[39]. The result was Equation (37). This linear Forchheimer equation was then modified to describe plane radial steady gas flow, yielding Equation (44).

Partial differential equations were developed to describe transient gas flow through linear and plane radial horizontal systems.

Numerical solutions were obtained for all four boundary conditions considered in the linear system; however, time limitations prohibited obtaining similar results for the radial system.

In order to determine whether the solutions obtained had converged with respect to the space variable, each of the four sets of boundary conditions specified in Table 1 were solved for three different dimensionless space increments using that set of dimensionless time increments which was considered optimal for the boundary condition in question. The three space increments used were

$$\Delta\overline{x} \;=\; 0.20,\ 0.10,\ \text{and}\ 0.05.$$

The convergence of the solutions with respect to the time variable was checked out in a similar manner. Using that dimensionless space increment which was considered

optimal, the four sets of boundary conditions were solved employing three different sets of dimensionless time increments. The ratio of the dimensionless time increments was maintained at two to one, that is

$$\frac{(\Delta t_D)_C}{(\Delta t_D)_B} = \frac{(\Delta t_D)_B}{(\Delta t_D)_A} = \frac{2}{1} \tag{54}$$

where $(\Delta t_D)_A$, $(\Delta t_D)_B$, and $(\Delta t_D)_C$ represent the three sets of dimensionless time increments that were employed for this convergence check. One set, $(\Delta t_D)_A$, is summarized in Table 3. From this table it can be seen that the value of the dimensionless time increments was increased as the dimensionless time increased.

Each set of the boundary conditions for the linear system was solved for dimensionless slip coefficients of 0.0, 0.2, and 0.4, and for dimensionless inertial resistance coefficients of 0, 10, 20, 30, 40, and 50. The two sets of boundary conditions involving a constant terminal mass producing rate were solved for dimensionless mass flow rates ($\overline{\rho q_x}$) of -0.10, -0.05, and -0.01. (The negative sign denotes production.) For the two boundary conditions involving a constant terminal pressure solutions were obtained for dimensionless pressures at the producing face of 0.10 and 0.25. This resulted in fifty-four solutions each for Cases I and II, and thirty-six solutions each for Cases III and IV.

Table 3

Case	Summary of the Dimensionless Time Increments $(\Delta t_D)_A$
I	$\Delta t_{D_{1-3}} = 0.02$; $\Delta t_{D_4} = 0.04$; $\Delta t_{D_{5-8}} = 0.05$; $\Delta t_{D_{9-11}} = 0.10$; $\Delta t_{D_{12-14}} = 0.20$; $\Delta t_{D_{15}} = 0.30$; $\Delta t_{D_{16-20}} = 0.50$; $\Delta t_{D_{21-22}} = 1.00$; $\Delta t_{D_{23-25}} = 2.00$
II	$\Delta t_{D_{1-3}} = 0.02$; $\Delta t_{D_4} = 0.04$; $\Delta t_{D_{5-8}} = 0.05$; $\Delta t_{D_{9-11}} = 0.10$; $\Delta t_{D_{12-14}} = 0.20$; $\Delta t_{D_{15}} = 0.30$; $\Delta t_{D_{16-26}} = 0.50$; $\Delta t_{D_{27-35}} = 1.00$
III	$\Delta t_{D_{1-4}} = 0.005$; $\Delta t_{D_{5-8}} = 0.010$; $\Delta t_{D_{9-10}} = 0.02$; $\Delta t_{D_{11-14}} = 0.025$; $\Delta t_{D_{15-18}} = 0.05$; $\Delta t_{D_{19-22}} = 0.10$; $\Delta t_{D_{23}} = 0.20$; $\Delta t_{D_{24-27}} = 0.25$; $\Delta t_{D_{28-31}} = 0.50$; $\Delta t_{D_{32-38}} = 1.00$
IV	$(\Delta t_{D_{1-38}})$ = same as for Case III.

Graphs for all four boundary conditions have been plotted from those results that were obtained at what was considered the optimal grid spacing, while these results themselves are presented in Appendix E.

A material balance, as developed in Appendix C, was performed in conjunction with these solutions. It serves as a check on the numerical procedure used in calculating the flow rates at the internal and the external boundaries and in calculating the pressure profiles in the reservoir. Table 5, which summarizes the material balance percentage errors, is presented in the next section.

DISCUSSION OF RESULTS

A. Discussion of Convergence

Figures 4, 5, 6, and 7 illustrate how variations in the dimensionless space increment affected the pressure-squared distribution. These curves show that a dimensionless space increment of 0.05 was sufficiently small to ensure convergence of the solution with respect to the space variable.

The effect that variations in the dimensionless time increment has on the pressure-squared distribution is illustrated by Figures 8, 9, 10, and 11. The curves show that, except for Case II, the solutions have not quite converged with respect to the time variable. Since increasing the number of time steps increases the computational time, it was felt that an optimum between computational accuracy and computational time had been reached using the set of dimensionless time increments, $(t_D)_A$.

Figures 4 through 11 are all plotted for a dimensionless inertial resistance coefficient of 30.0 and a dimensionless slip coefficient of 0.2. Since these values are the median values of the variables considered, graphs employing these values should give a good indication of the convergence trends for the entire range of variables studied.

In addition, the following convergence trends were observed for the four sets of boundary conditions considered:

1. The deviations between solutions obtained using two different grid spacings decreased as the dimensionless slip coefficient increased.
2. The deviations between solutions obtained using two different grid spacings increased as the dimensionless inertial resistance coefficient increased.

Problems were encountered with the two sets of boundary conditions where pressure at the outlet face was held constant - for one condition only. When inertial effects were negligible (i.e. $\overline{B} = 0.0$) but the slippage effects were not, the deviations between solutions obtained at two different grid spacings were appreciably higher than normal. The terms $C(u,u_{\overline{x}})$ and $D(u,u_{\overline{x}})$ in Equation (43) become highly nonlinear when the dimensionless inertial coefficient is zero. Because slippage effects are not negligible, the first-order derivative must also be retained and convergence problems, which are otherwise negligible, become significant.

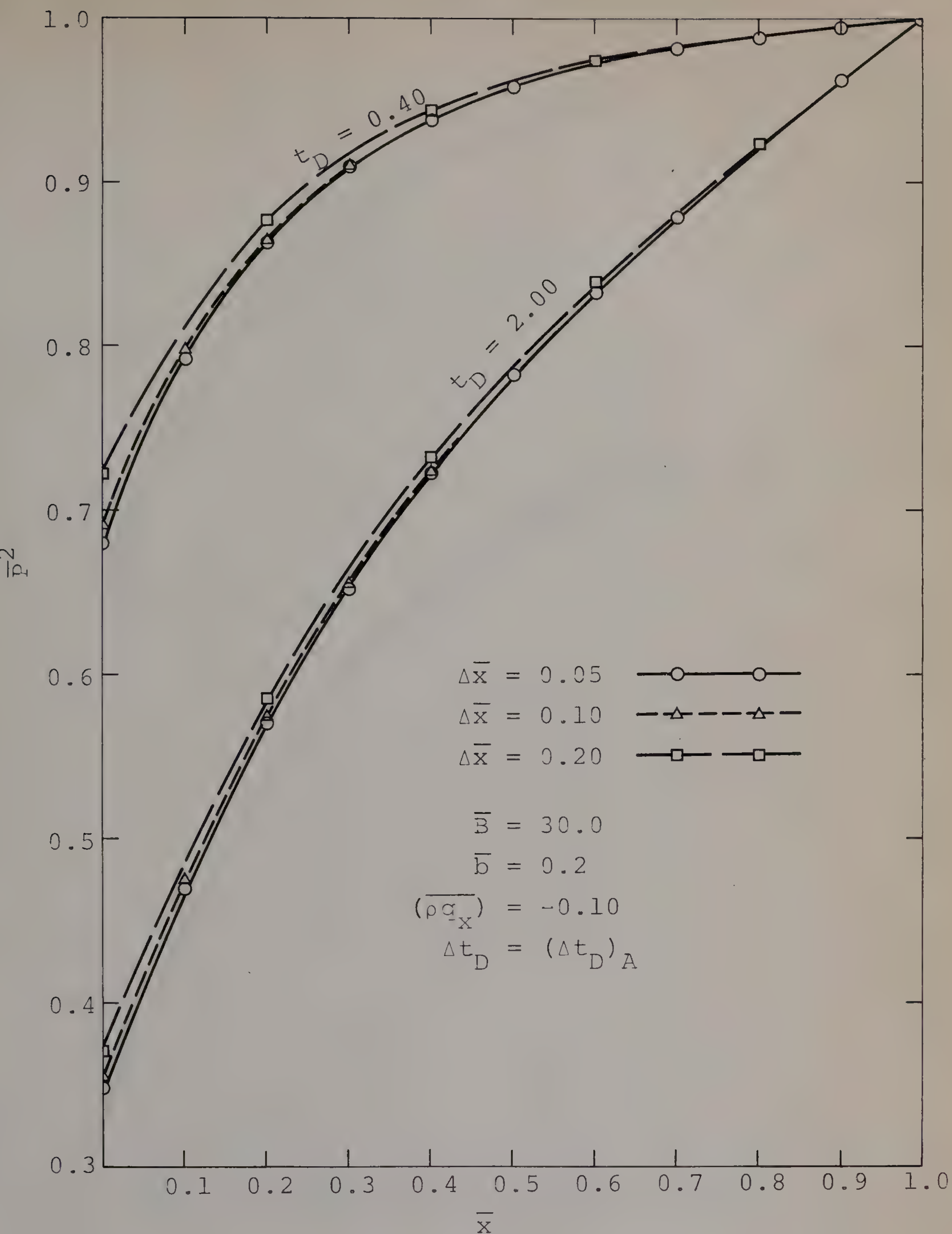


Figure 4. Convergence Check on Space Variable
- Case I

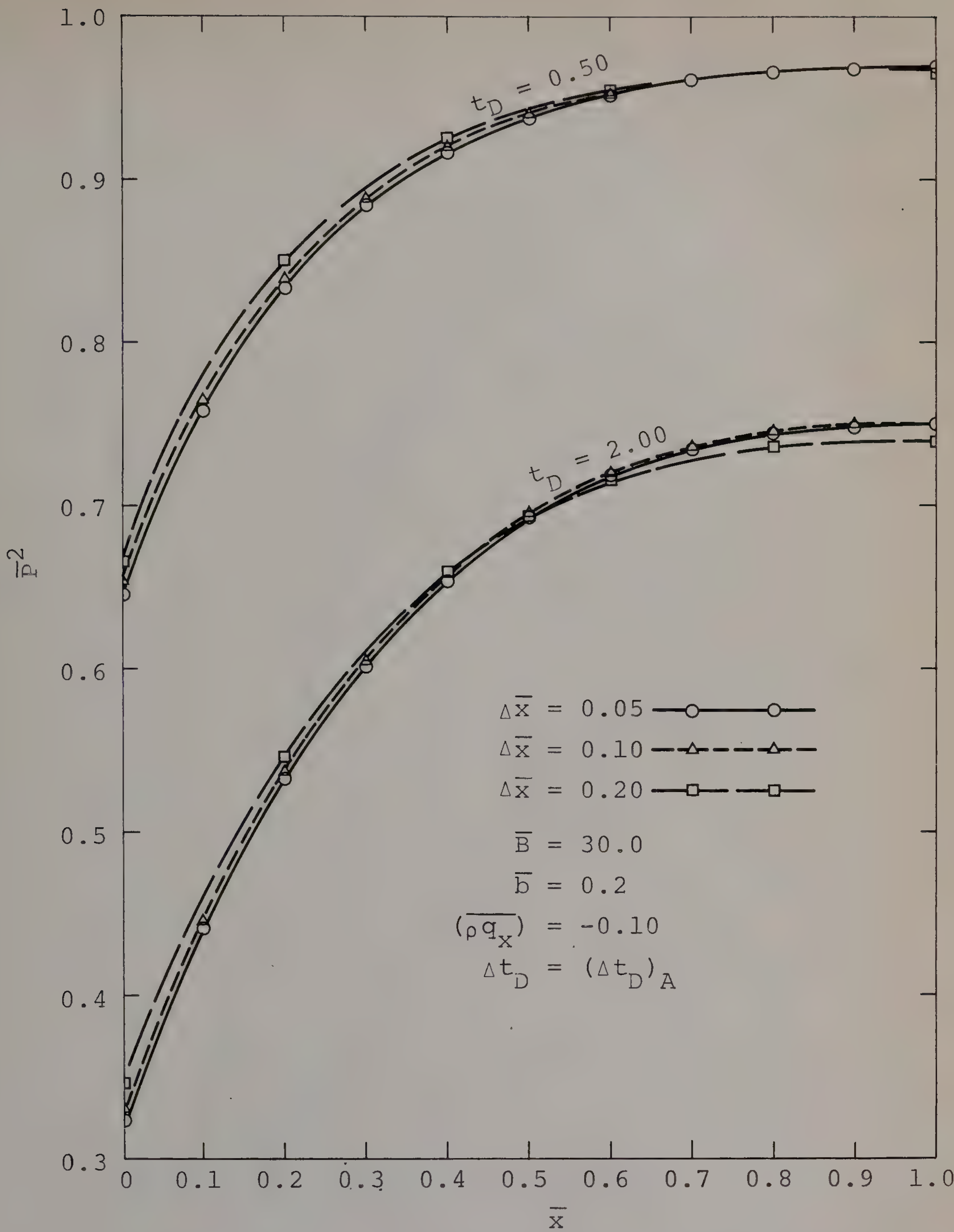


Figure 5. Convergence Check on Space Variable
- Case II

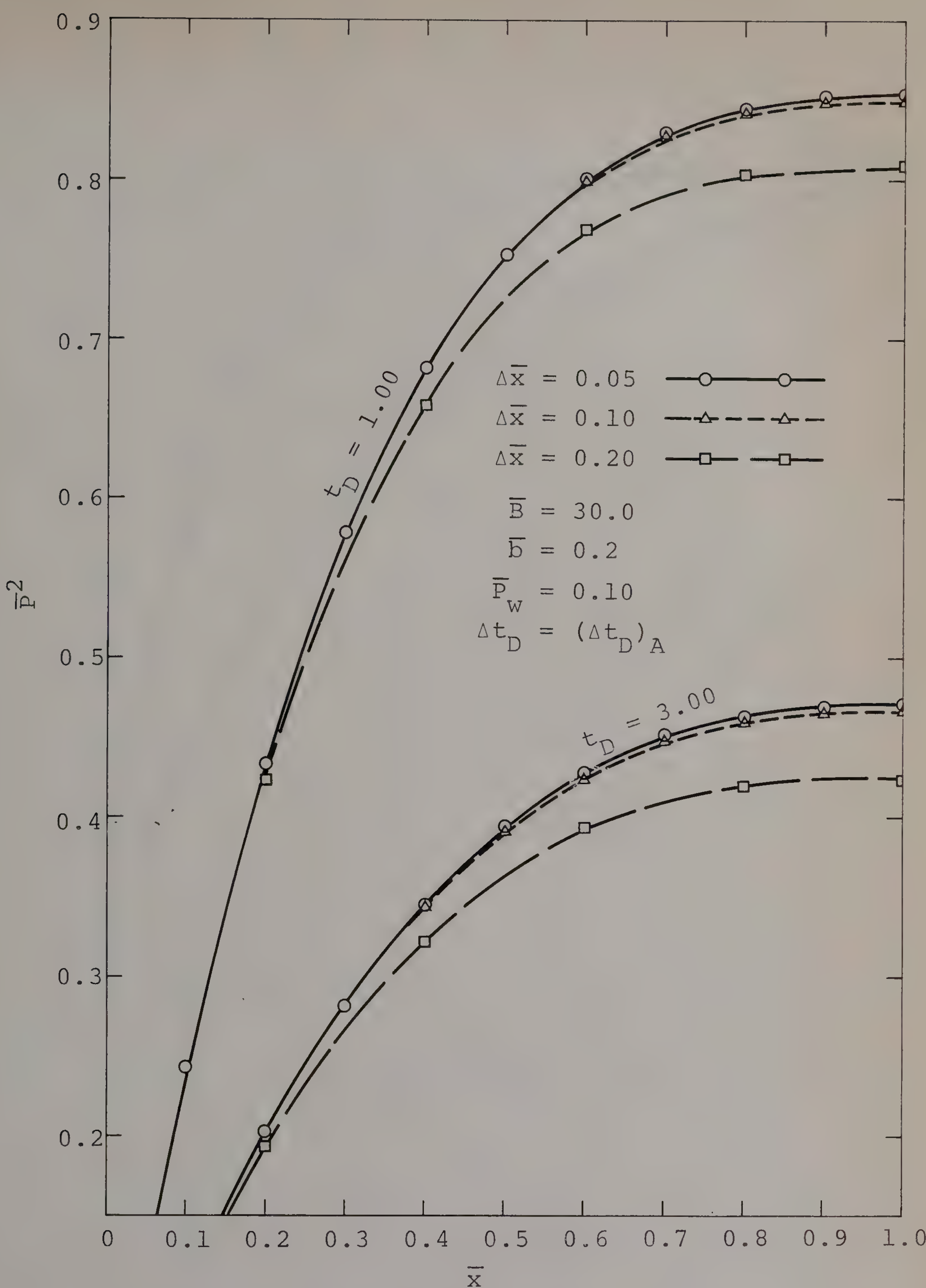


Figure 6. Convergence Check on Space Variable
- Case III

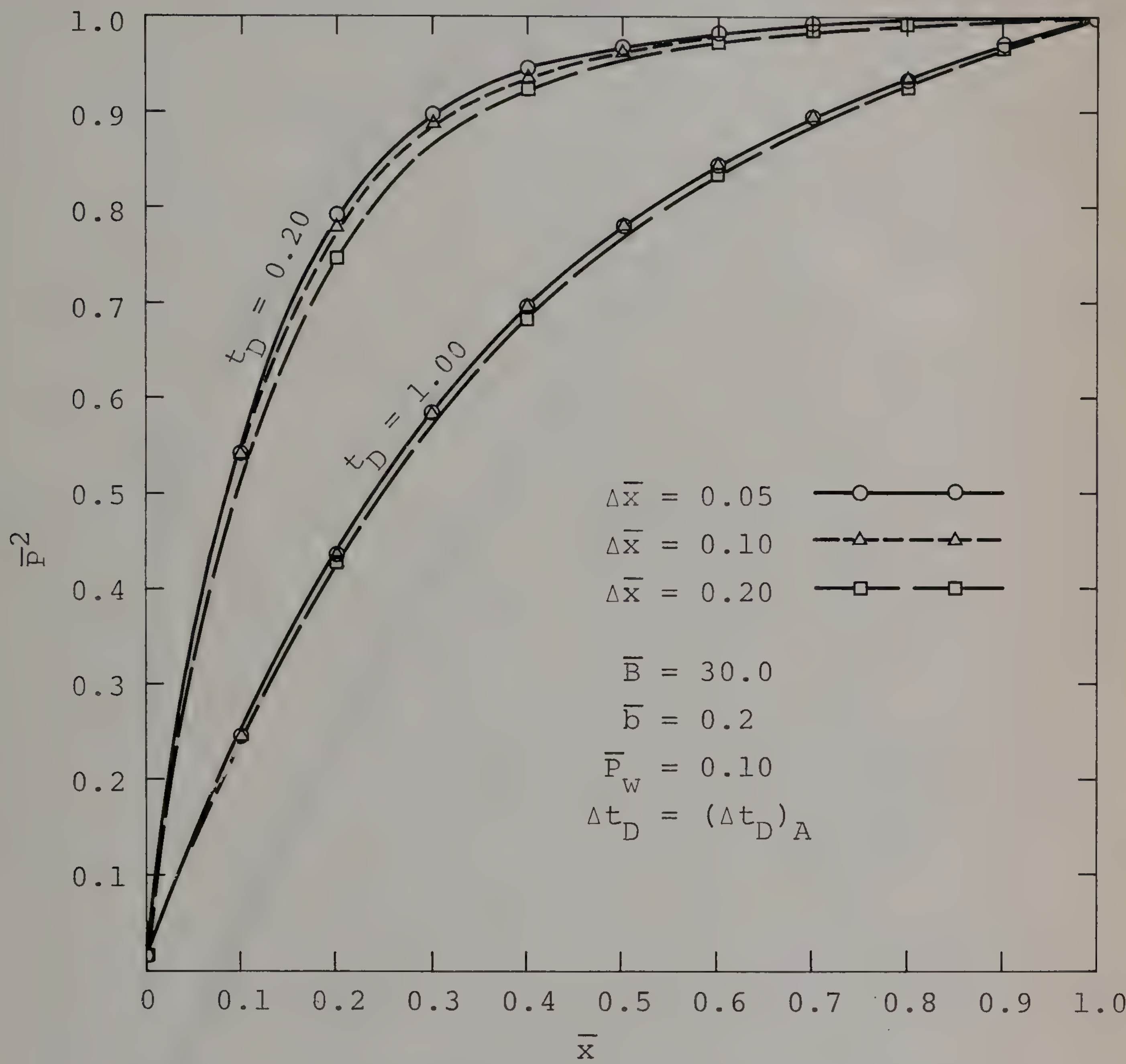


Figure 7. Convergence Check on Space Variable - Case IV

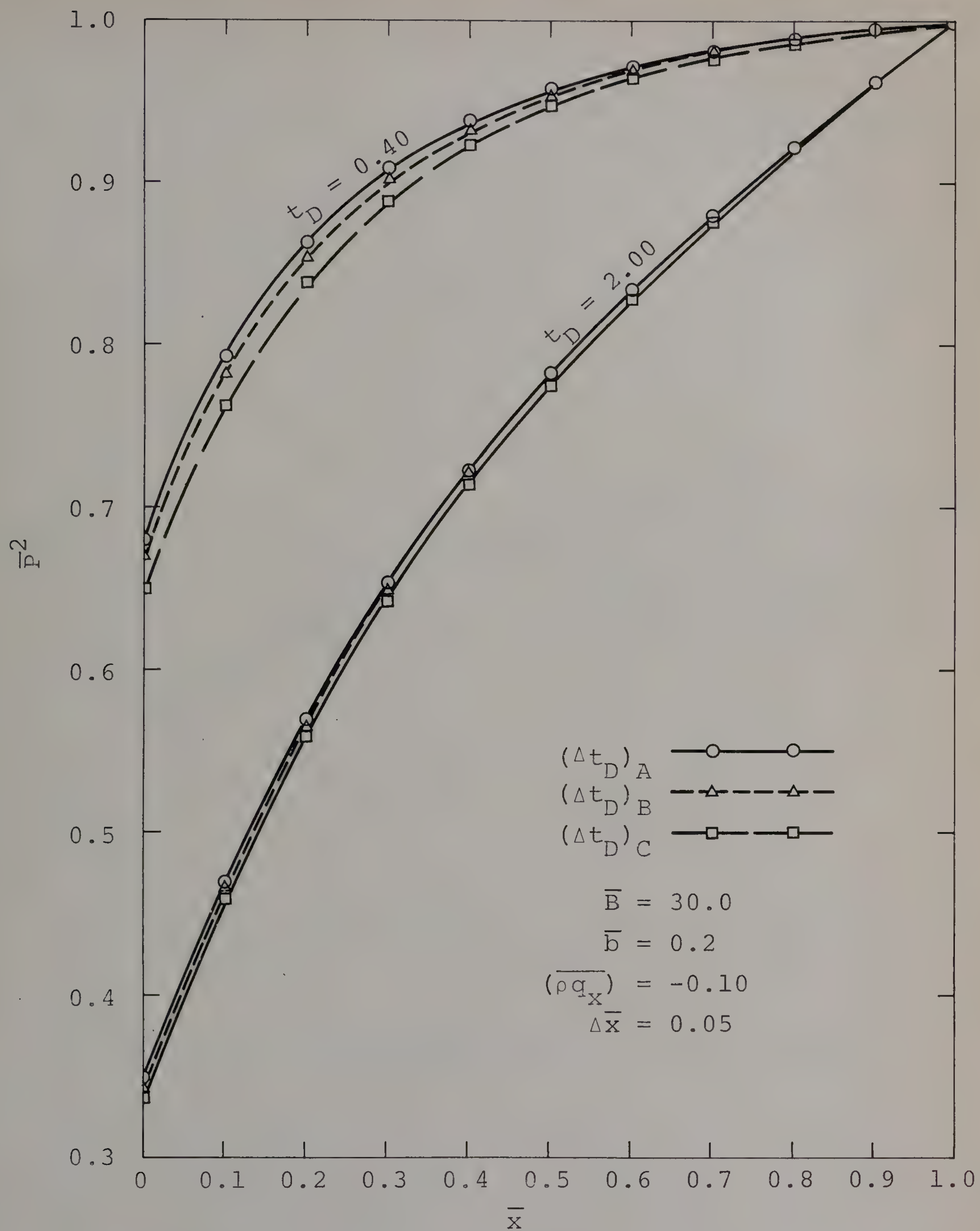


Figure 8. Convergence Check on the Time Variable - Case I

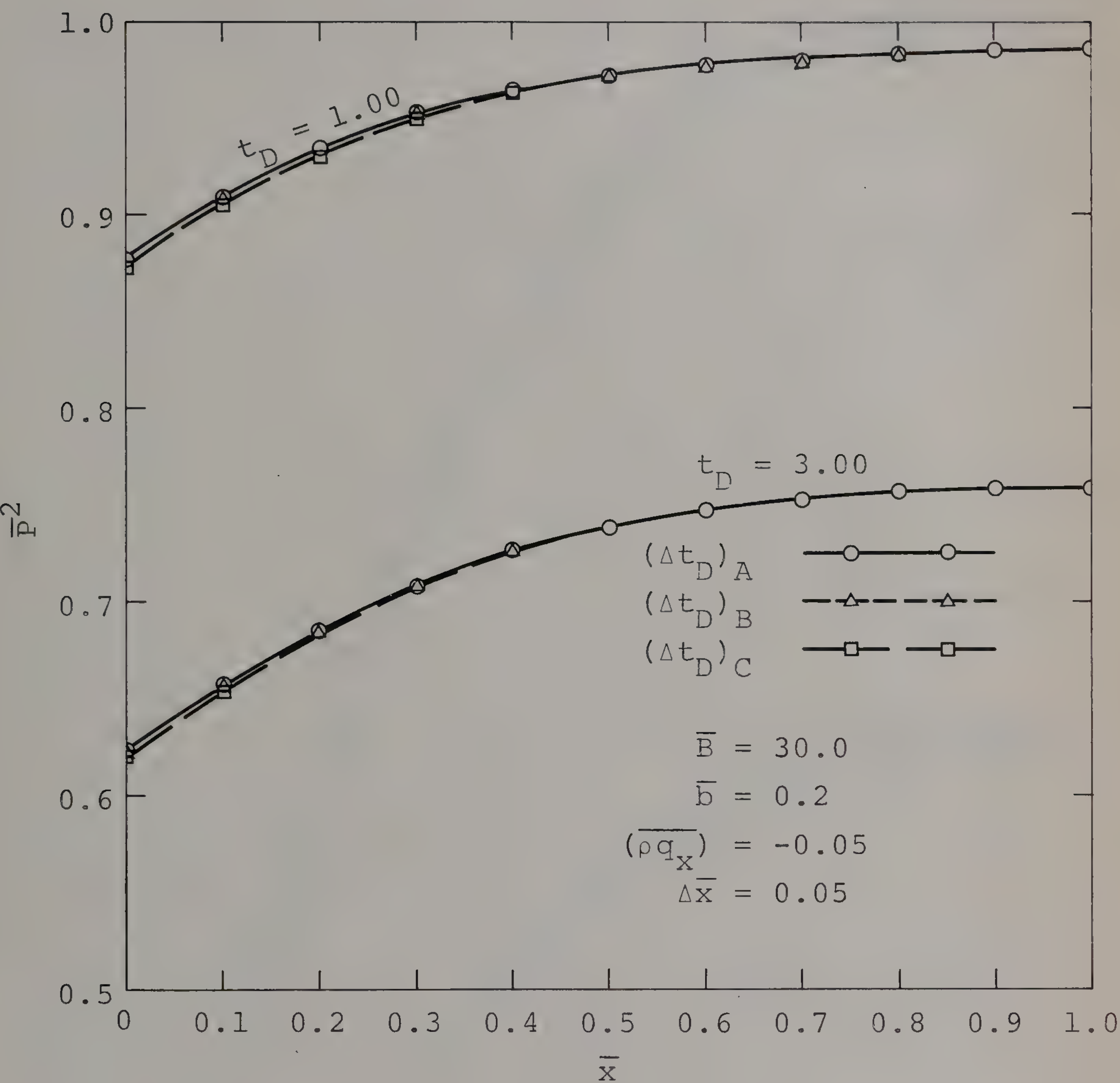


Figure 9. Convergence Check on Time Variable - Case II

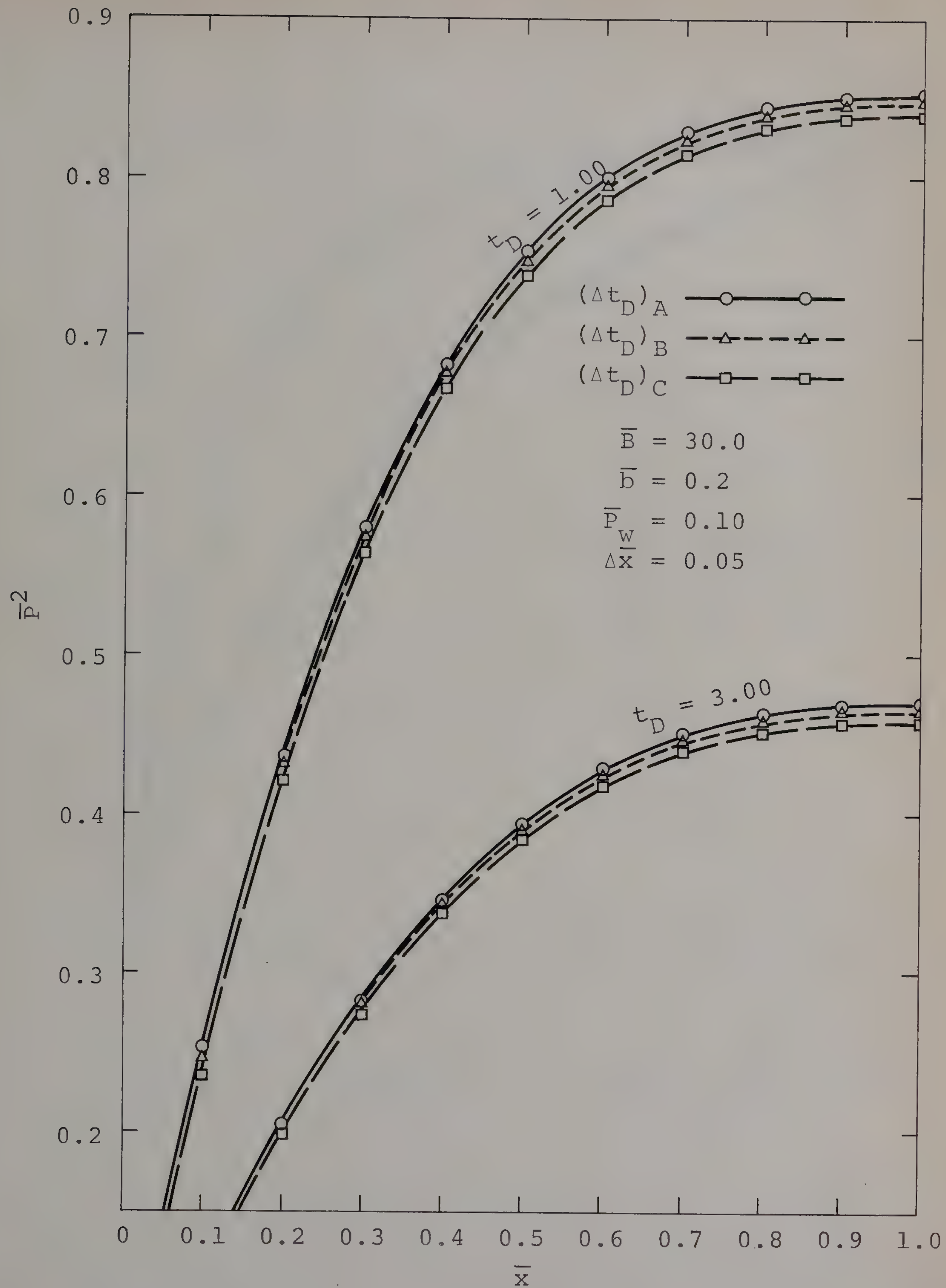


Figure 10. Convergence Check on Time Variable
- Case III

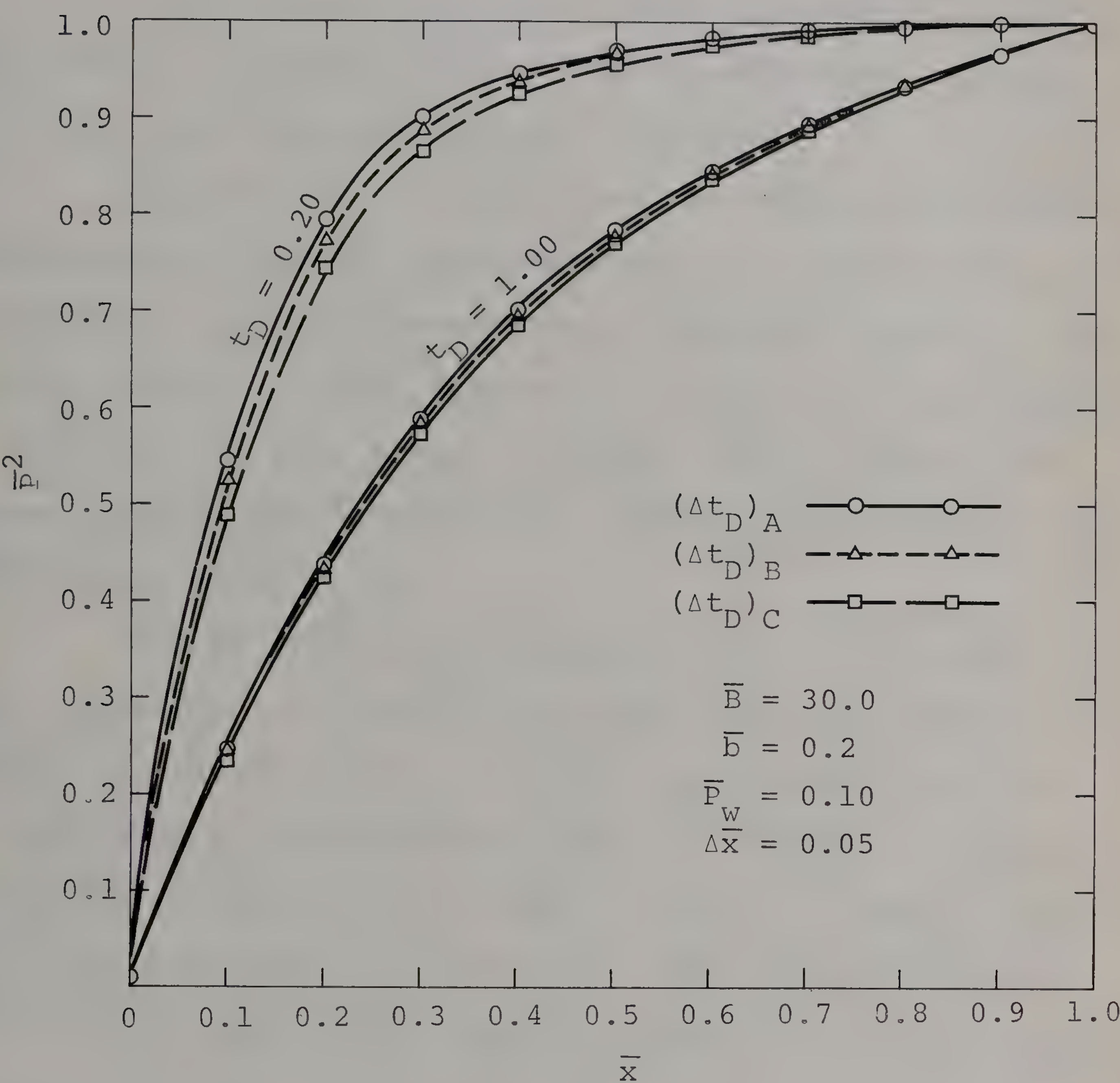


Figure 11. Convergence Check on Time Variable - Case IV

B. Discussion of Results Obtained at the Optimal Grid Spacing

Since there is a large number of results included in this section, they have been grouped according to boundary condition, thus simplifying their labelling.

Figures 12 to 34 inclusive were obtained employing dimensionless space and time increments of 0.05 and $(\Delta t_D)_A$, respectively. Both increments were considered optimal. The primary purpose of these figures is to illustrate the behavior of the reservoir with respect to time, and to indicate the manner in which the dimensionless inertial resistance and slip coefficients affect flow.

The pressure-squared distributions in the reservoirs, when transient Darcy flow occurs, are indicated by Figures 12, 20, 26, and 31. It may be seen that Case I and IV stabilized at dimensionless times of 3.0 and 1.0 respectively, as is indicated by Figures 12 and 31. Cases II and III, which depleted at dimensionless times of approximately 7.5 and 10.0 respectively, are represented by Figures 12 and 31.

Figures 13, 21, and 27, and Table 4 indicate effects of the dimensionless slip coefficient on the pressure-squared distributions. From Figure 13 it is obvious that the molecular streaming effects become more significant as dimensionless time increases. This is expected since pressure in the reservoir decreases with time and the slippage phenome-

non becomes more pronounced at lower flowing pressures. It is interesting to note that Case I stabilized at approximately the same dimensionless time regardless of the slip coefficient; however, the stabilized pressure-squared distributions themselves depended considerably upon the value of the dimensionless slip coefficient.

Figure 21 shows that the pressure distributions for different dimensionless slip coefficients cross over. This can be attributed to the boundary conditions which state that the reservoir is being depleted at a constant rate. The mean pressure in the reservoir must therefore remain constant for any dimensionless time regardless of the slippage effects.

Figure 27 indicates the contribution that molecular streaming makes on the pressure profiles for Case III. A similar plot for Case IV was not included because the range of dimensionless slip coefficients considered did not cause any appreciable differences. However, the results obtained are summarized in Table 4.

The effect of the dimensionless inertial resistance coefficient on the pressure-squared distribution is exhibited by Figures 14, 15, 22, 23, 28, and 32. Deviations from the Darcy-continuity solution increased with increasing inertial effects. These deviations are more pronounced than the deviations caused by slippage. When inertial effects are included, another resistance to flow is introduced and the pressure-squared gradient increases. This steepens the profiles while

slippage decreases the resistance to flow and flattens out the profiles. Therefore, when both effects are accounted for, the corrections for each tend to cancel out.

Figures 14 and 15 show that the additional pressure drop due to the inertial resistance term is more severely affected by a decreasing flow rate than the pressure drop that is due to the viscous resistance term. The same feature can be observed for Case II from Figures 22 and 23. This is expected because the pressure drop due to the inertial term is dependent on the square of the dimensionless mass flow rate while the pressure drop due to the viscous term is linearly dependent on the dimensionless mass flow rate. Figures 28 and 32, which also show the effect of the dimensionless inertial resistance coefficient on the pressure-squared distribution, are self-explanatory.

The effect of the dimensionless slip coefficient and the dimensionless inertial resistance coefficient on the pressure at the producing face is illustrated by Figures 16, 17, 24, and 25. These plots are applicable to the constant terminal rate cases only - Case I and Case II. It is evident from these plots that, for the range of variables considered, the inertial effects are again dominant.

By comparing Figure 16 with Figure 17 and Figure 24 with Figure 25, it may be observed that a marked difference occurs when the mass flow rate is decreased. For a dimensionless mass flow rate of -0.01, the curves for different

dimensionless inertial resistance coefficients were practically superimposed. No conclusions other than the one already stated could be inferred from the additional results obtained for a flow rate of -0.01. Consequently these results are not included.

Figures 18, 19, 29, 30, 33, and 34 show the effect of the dimensionless inertial resistance and slip coefficients on the dimensionless mean pressure of the reservoir.

Since $\overline{P}_M = (1.0 - \overline{W}_p)$, as indicated in Appendix C, these figures also represent the depletion history of the specific reservoir in question.

It is obvious from Figures 18 and 19 that the depletion rates for Case I increase with increasing inertial effects and decrease with increasing molecular streaming. This merely verifies the fact that the pressure drop corresponding to a fixed flow rate increases as the inertial effects increase. In Figure 18 the curves for $\overline{B}$ = 30, 40, and 50 do not extend over the entire range of dimensionless times considered since the pressure at the producing face dropped below a value of zero. Production was therefore terminated at this point. This problem did not occur for a dimensionless mass flow rate of -0.05, as evidenced from Figure 19.

For Case II the mass production rate from the reservoir remains constant with respect to time and the depletion rate remains constant as well. Furthermore, the mean pressure is independent of the values of the inertial

and the slippage terms because, in spite of these added effects, the net flow from the reservoir is governed by the boundary conditions alone. Consequently depletion for all values of the inertial and slippage terms followed the same straight line decline, and plots similar to Figures 18 and 19 were not included.

Figures 29 and 30 and Figures 33 and 34 show that the depletion rates for Case III and Case IV decrease with increasing inertial effects and increase with increasing slip. This is opposite to the trend in Case I, but nevertheless, is reasonable for the case of a constant pressure at the producing face. This is due to the fact that the pressure gradient must increase when the inertial term increases or when the slippage term decreases. Therefore, since the pressure is fixed at the producing face, the interior pressures must all be higher. This corresponds to a higher mean pressure in the reservoir and thus a lower depletion rate. The lines corresponding to a dimensionless slip coefficient of 0.4 were not included in Figures 29 and 30 because they would fuse the family of curves and detract from the overall clarity of presentation. For Case IV the small differences in the depletion rates due to molecular streaming did not warrant including these differences on Figures 33 and 34.

CASE I

CONSTANT TERMINAL RATE WITH A CONSTANT PRESSURE AT THE EXTERNAL BOUNDARY

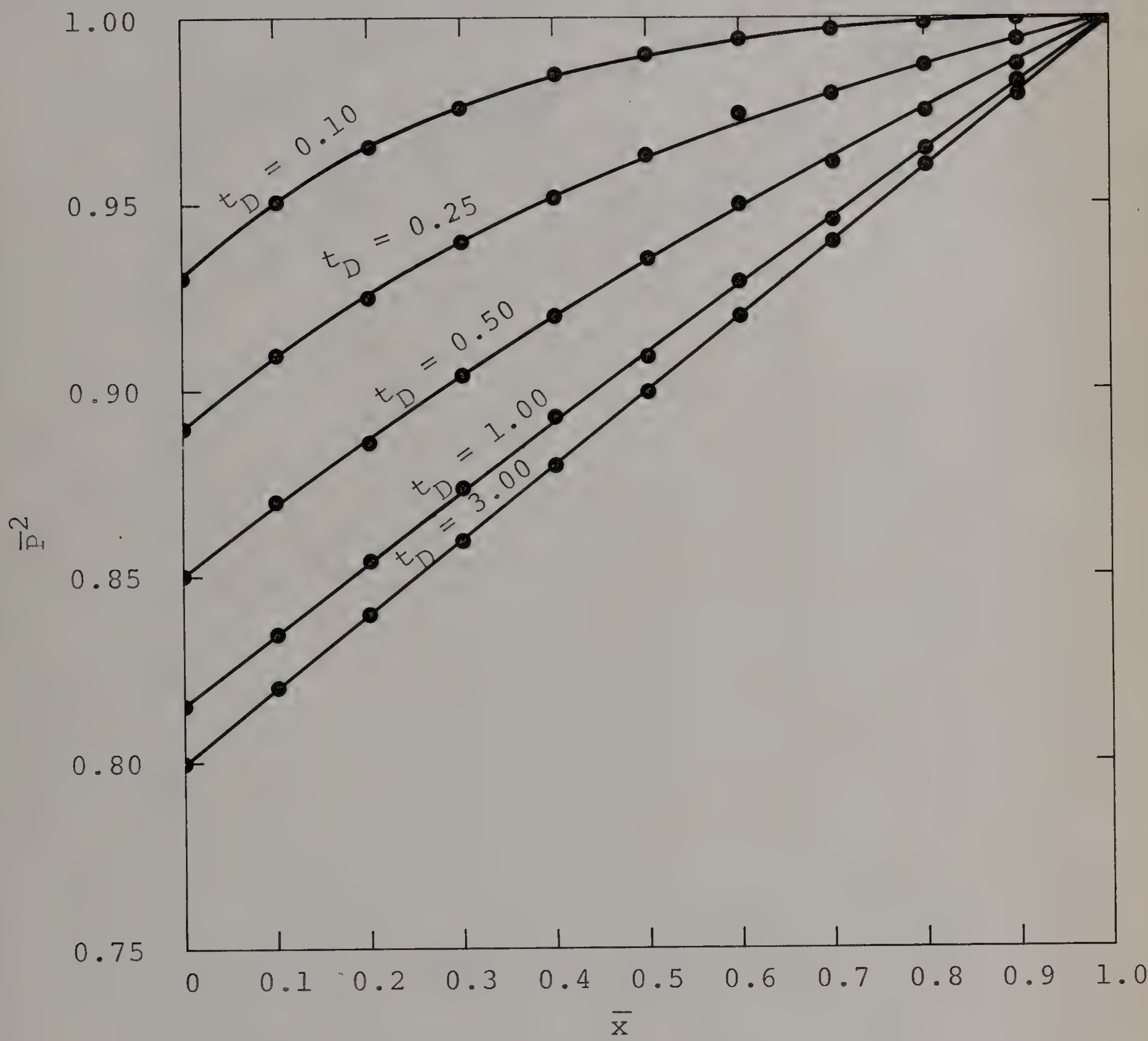


Figure 12. Pressure-Squared Distribution for $\bar{B} = 0.0$ and $\bar{b} = 0.0$ $(\overline{\rho q_x}) = -0.10$

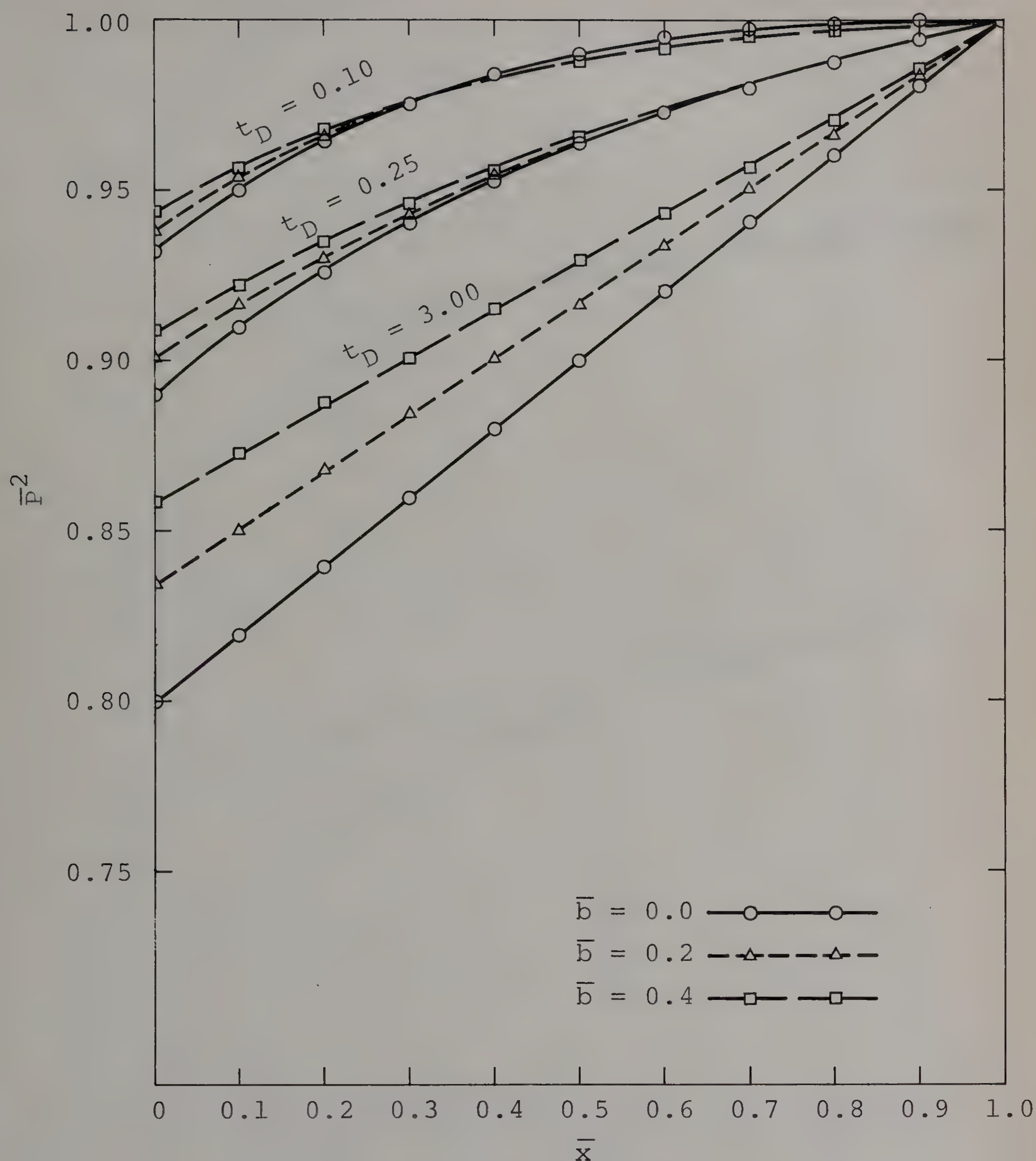


Figure 13. Effect of $\bar{b}$ on Pressure-Squared Distribution $\bar{B} = 0.0$ $(\overline{\rho q_x}) = -0.05$

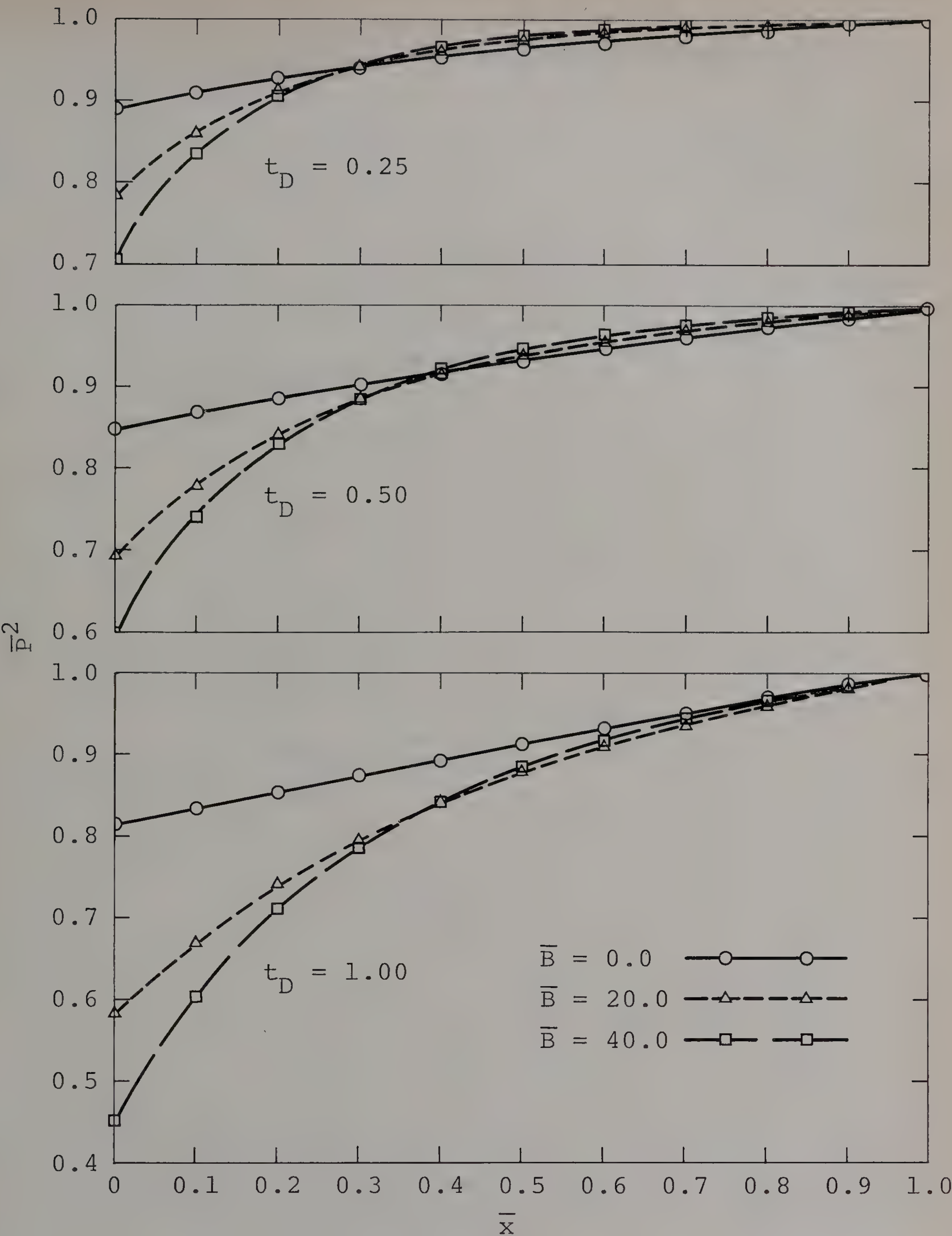


Figure 14. Effect of $\overline{B}$ on Pressure-Squared Distribution $\overline{b}$ = 0.0 $(\overline{\rho q_x})$ = -0.10

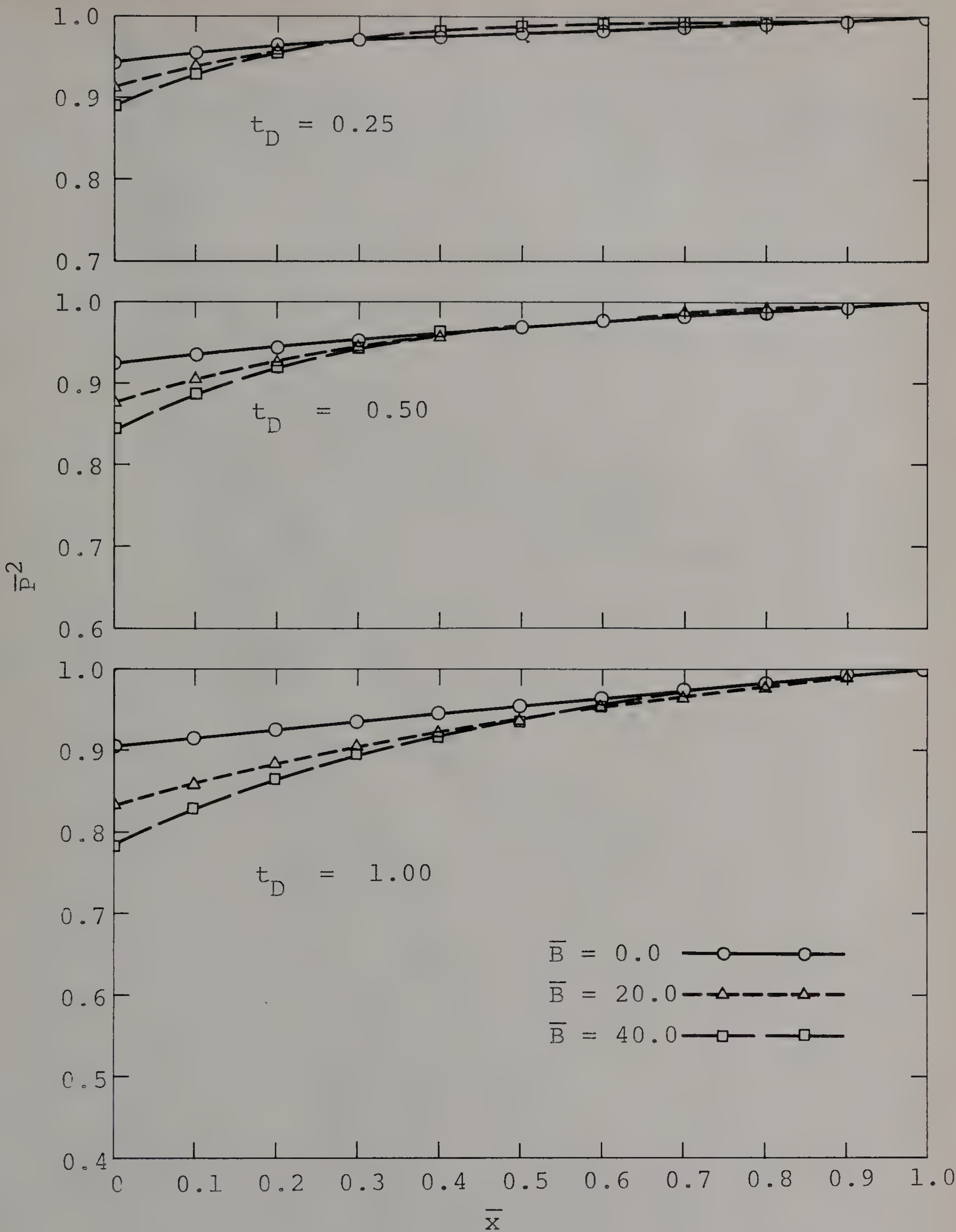


Figure 15. Effect of $\bar{B}$ on Pressure-Squared Distribution $\bar{b}$ = 0.0 $(\overline{\rho q_x})$ = -0.05

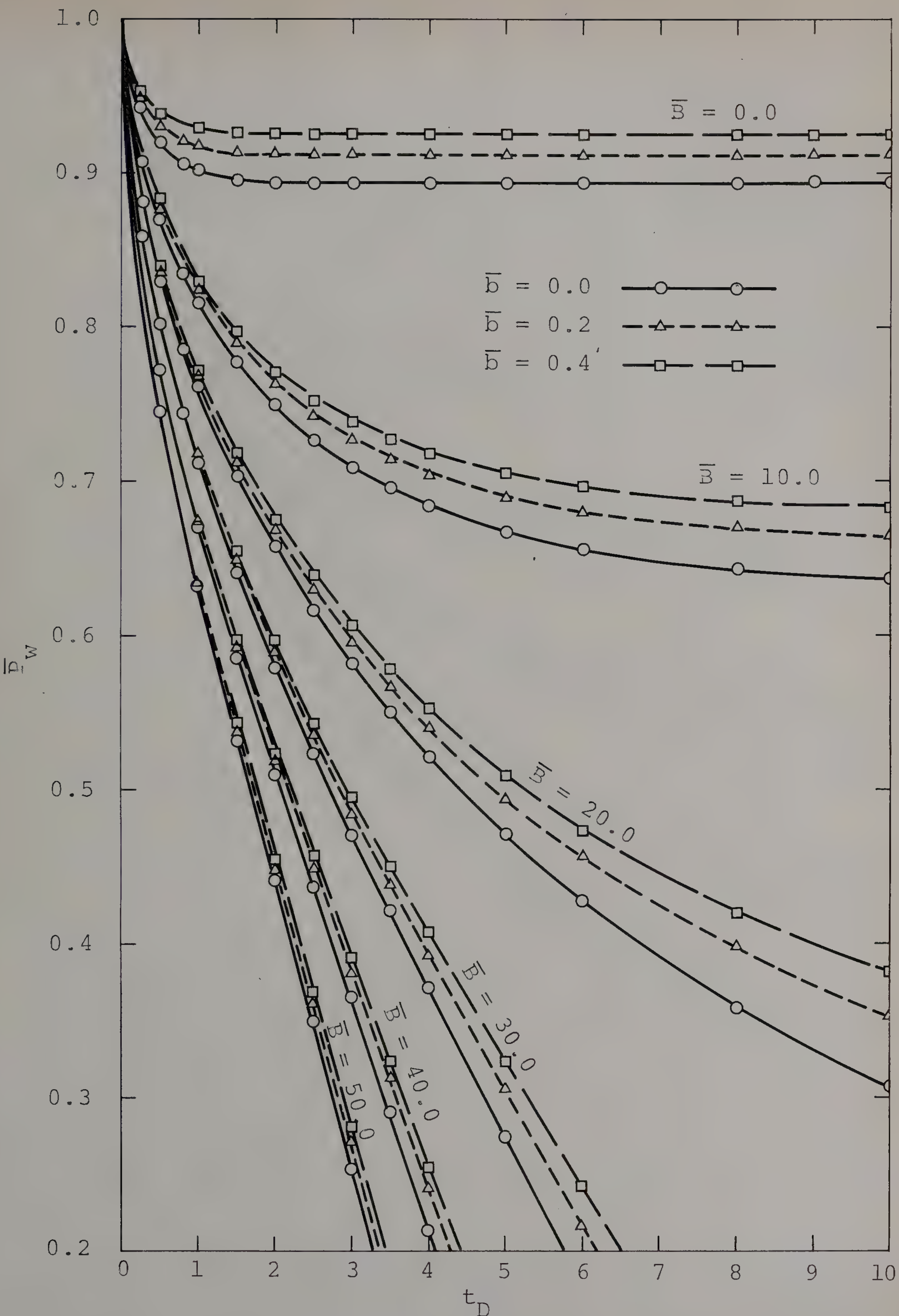


Figure 16. Effect of $\overline{B}$ and $\overline{b}$ on Outlet Pressure $(\overline{\rho q_x}) = 0.10$

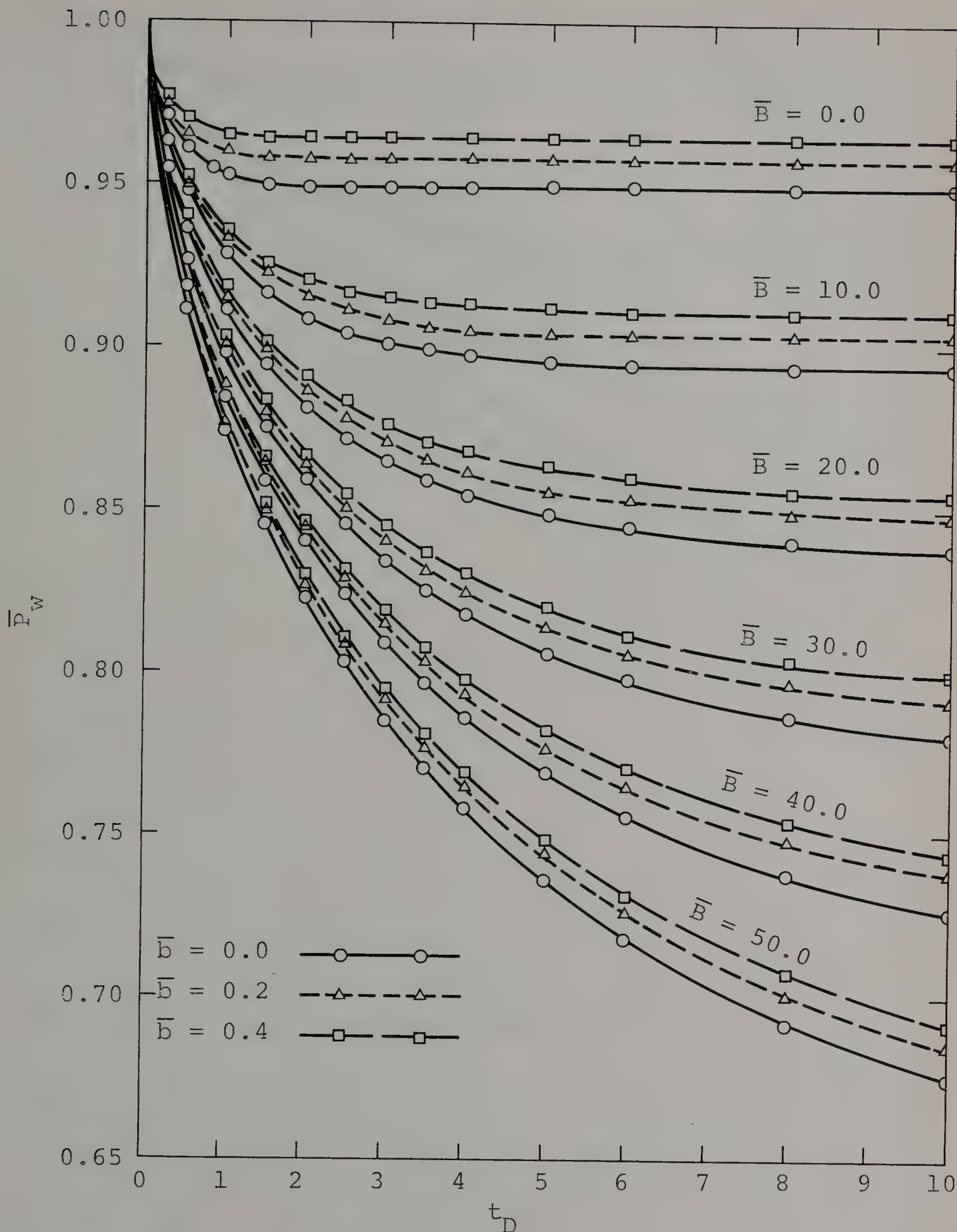


Figure 17. Effect of $\overline{B}$ and $\overline{b}$ on Outlet Pressure
$(\overline{\rho q_x}) = -0.05$

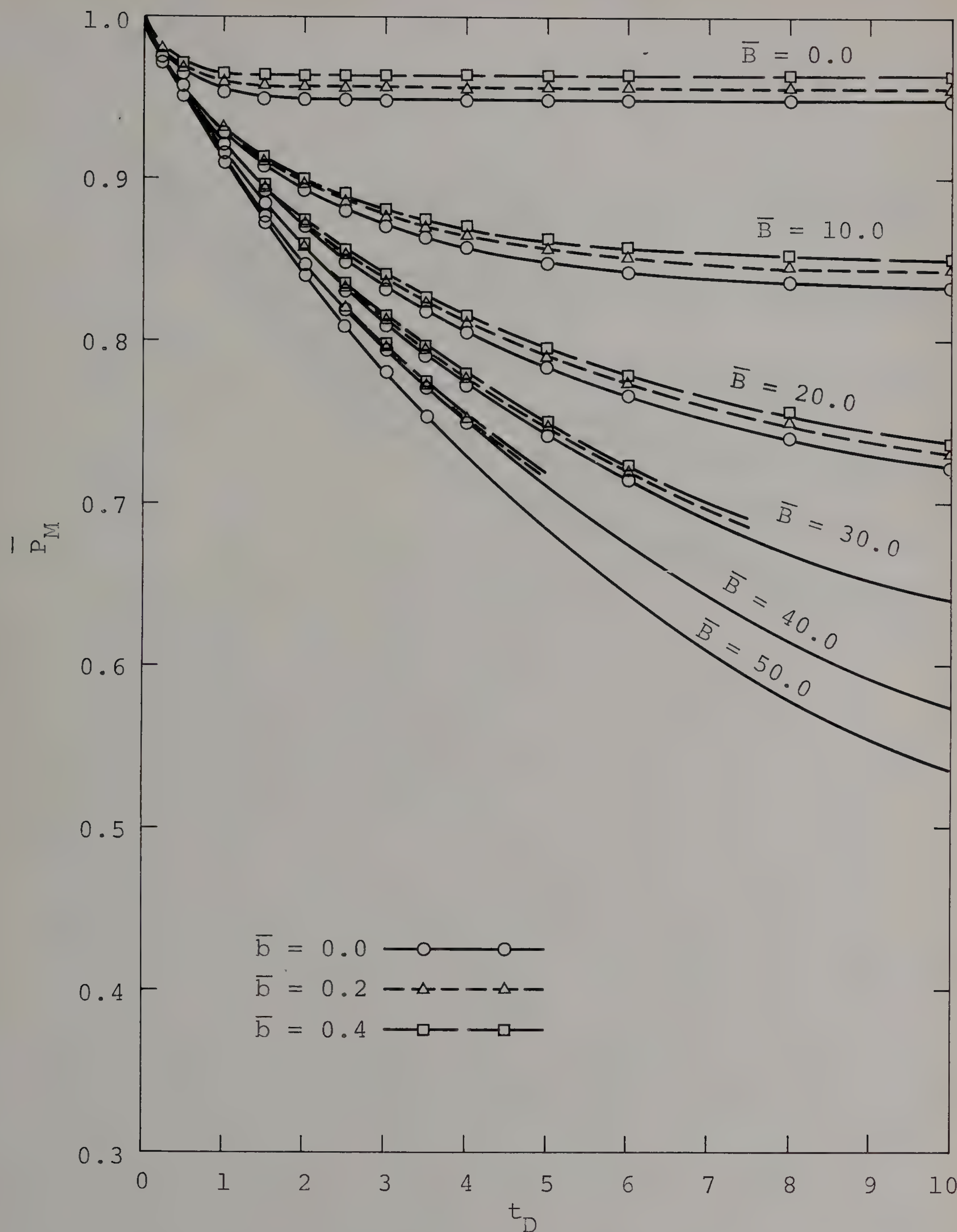


Figure 18. Effect of $\overline{B}$ and $\overline{b}$ on Mean Pressure
$(\overline{\rho q_x}) = -0.10$

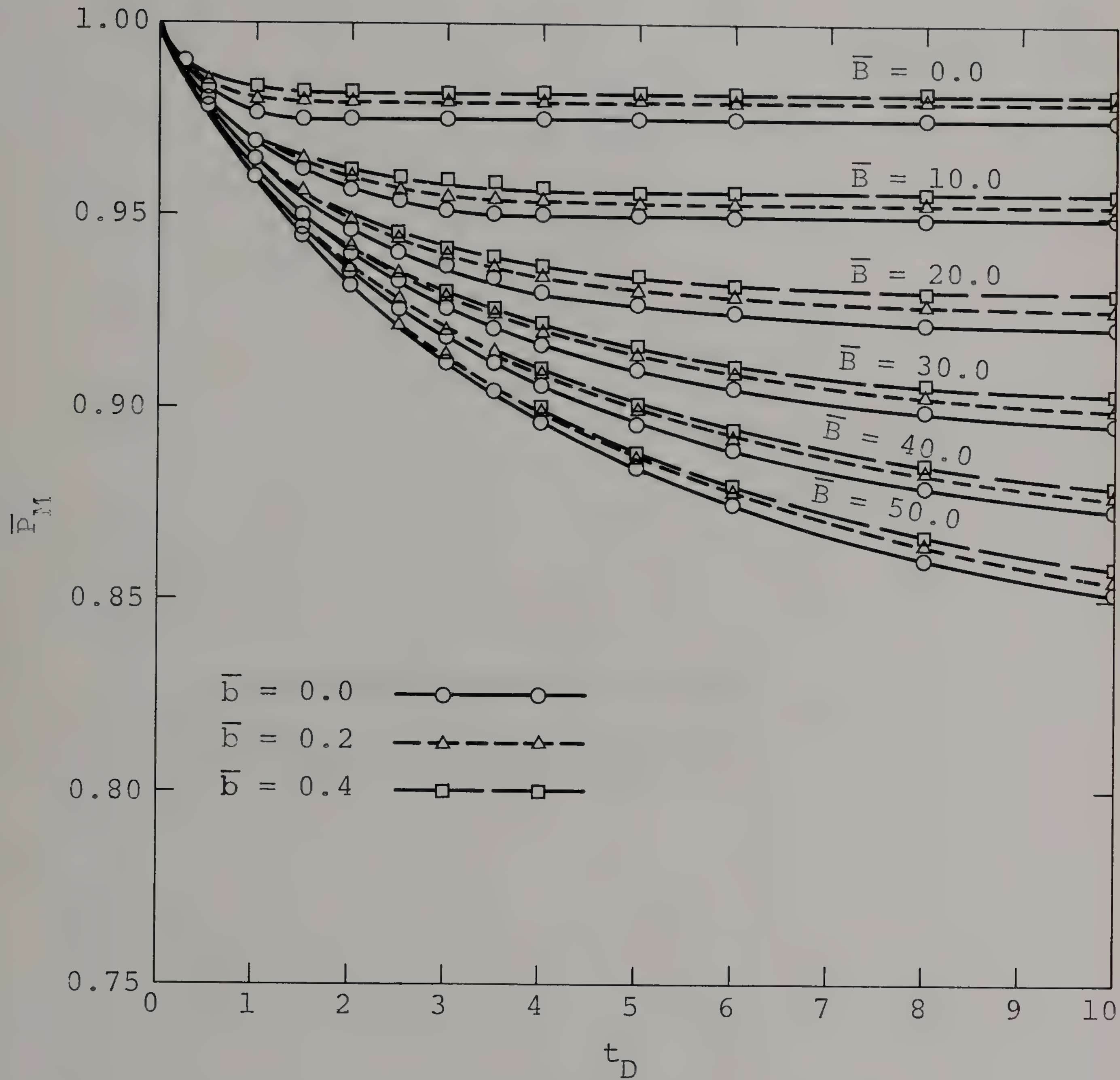


Figure 19. Effect of $\overline{B}$ and $\overline{b}$ on Mean Pressure
$(\overline{\rho q_x}) = -0.05$

CASE II

CONSTANT TERMINAL RATE AND

SEALED EXTERNAL BOUNDARY

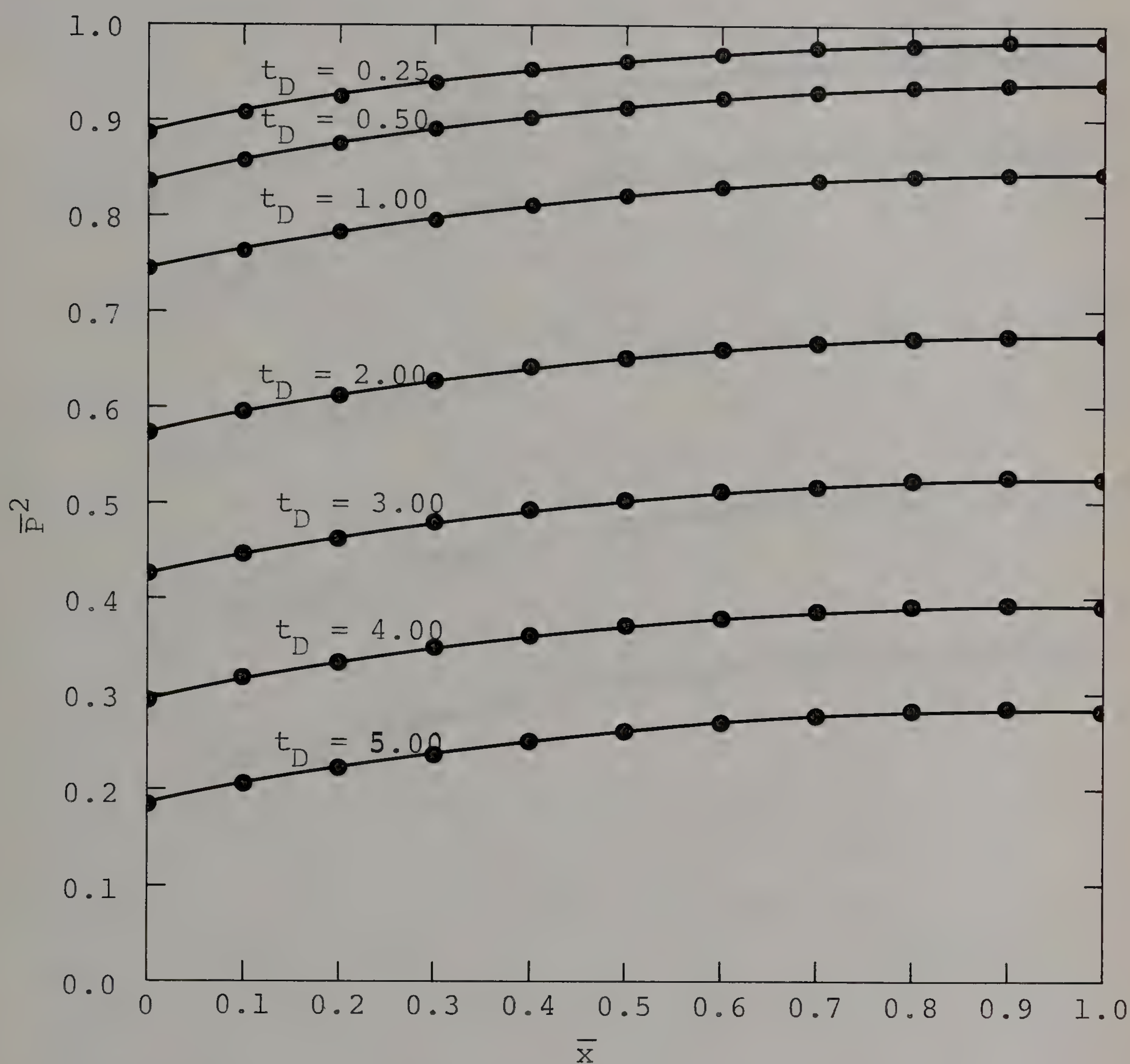


Figure 20. Pressure-Squared Distribution
$\overline{B} = 0.0$ and $\overline{b} = 0.0$ $\quad (\overline{\rho q_x}) = -0.10$

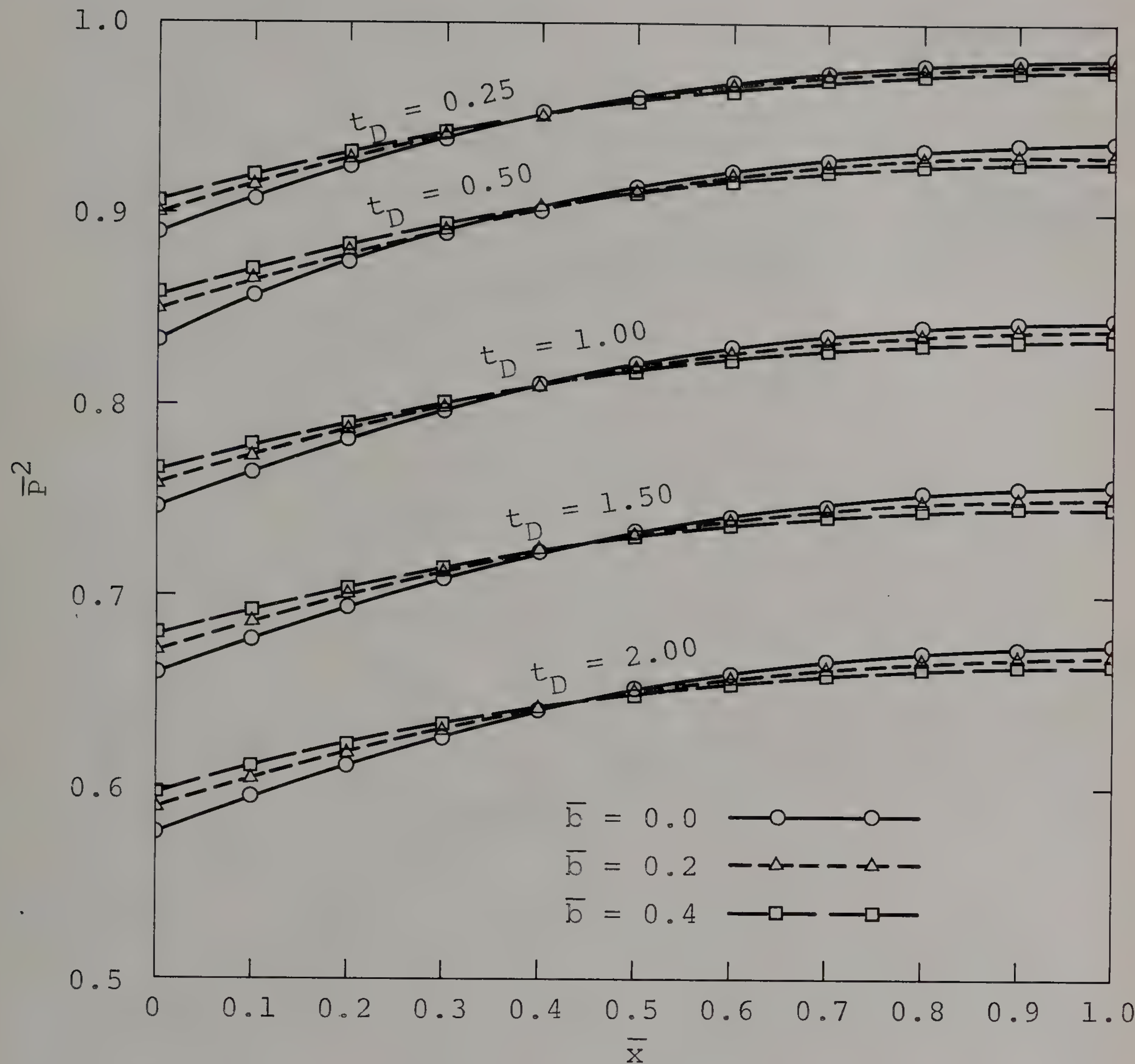


Figure 21. Effect of $\bar{b}$ on Pressure-Squared Distribution $\bar{B}$ = 0.0 $(\overline{\rho q_x})$ = -0.10

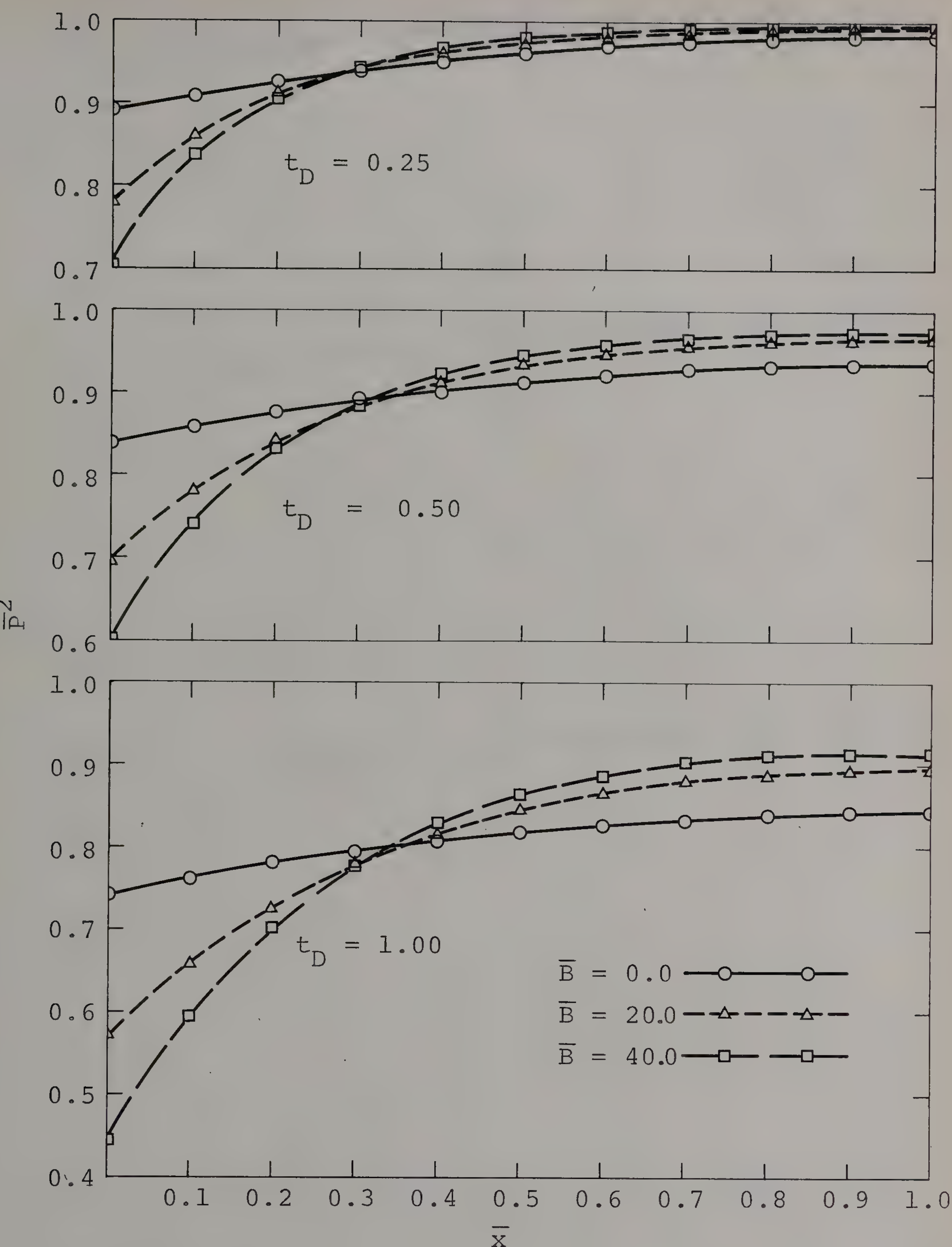


Figure 22. Effect of $\bar{B}$ on Pressure-Squared Distribution $\bar{b}$ = 0.0 $(\overline{\rho q_x})$ = -0.10

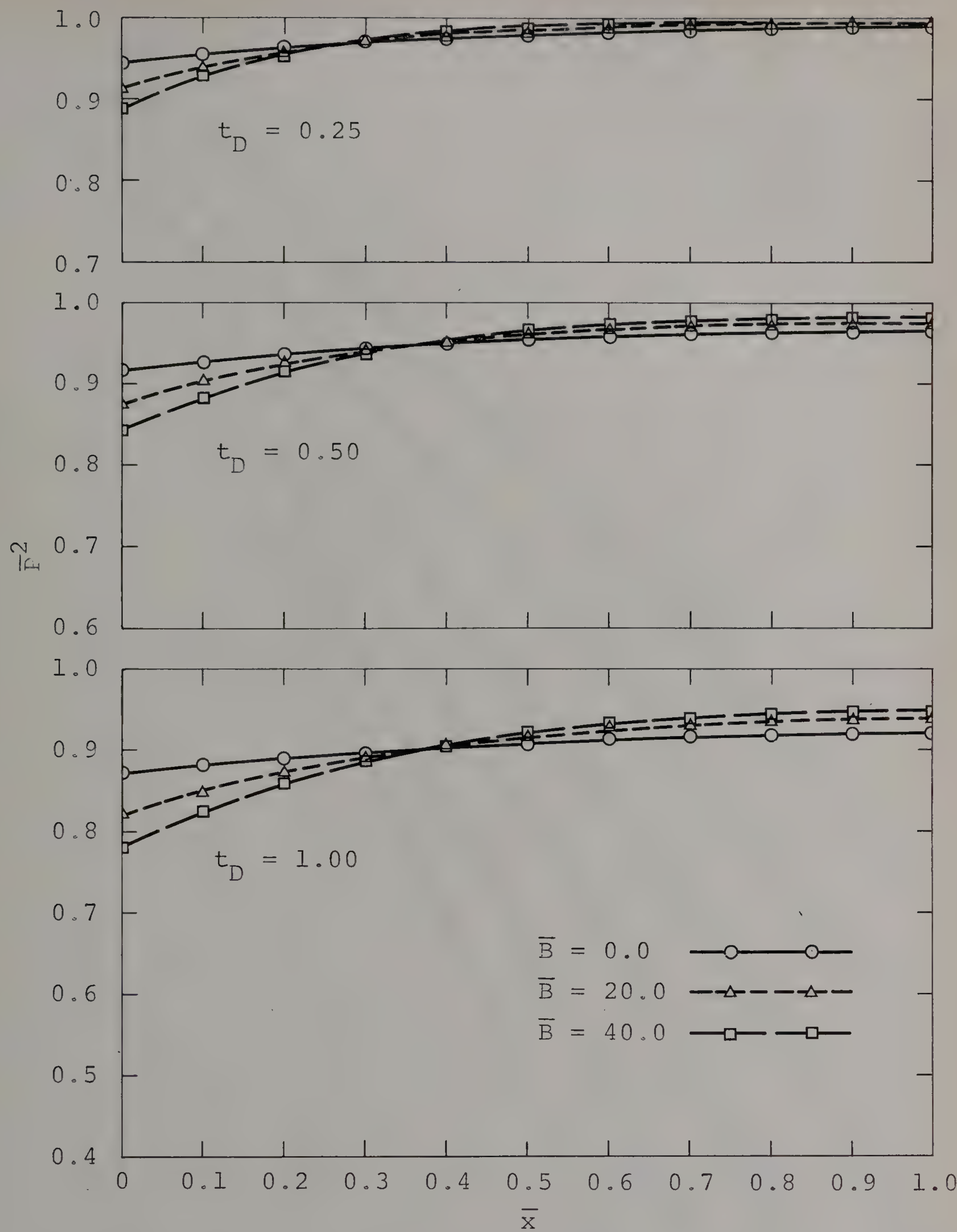


Figure 23. Effect of $\bar{B}$ on Pressure-Squared Distribution $\bar{b}$ = 0.0 $(\overline{\rho q_x})$ = -0.05

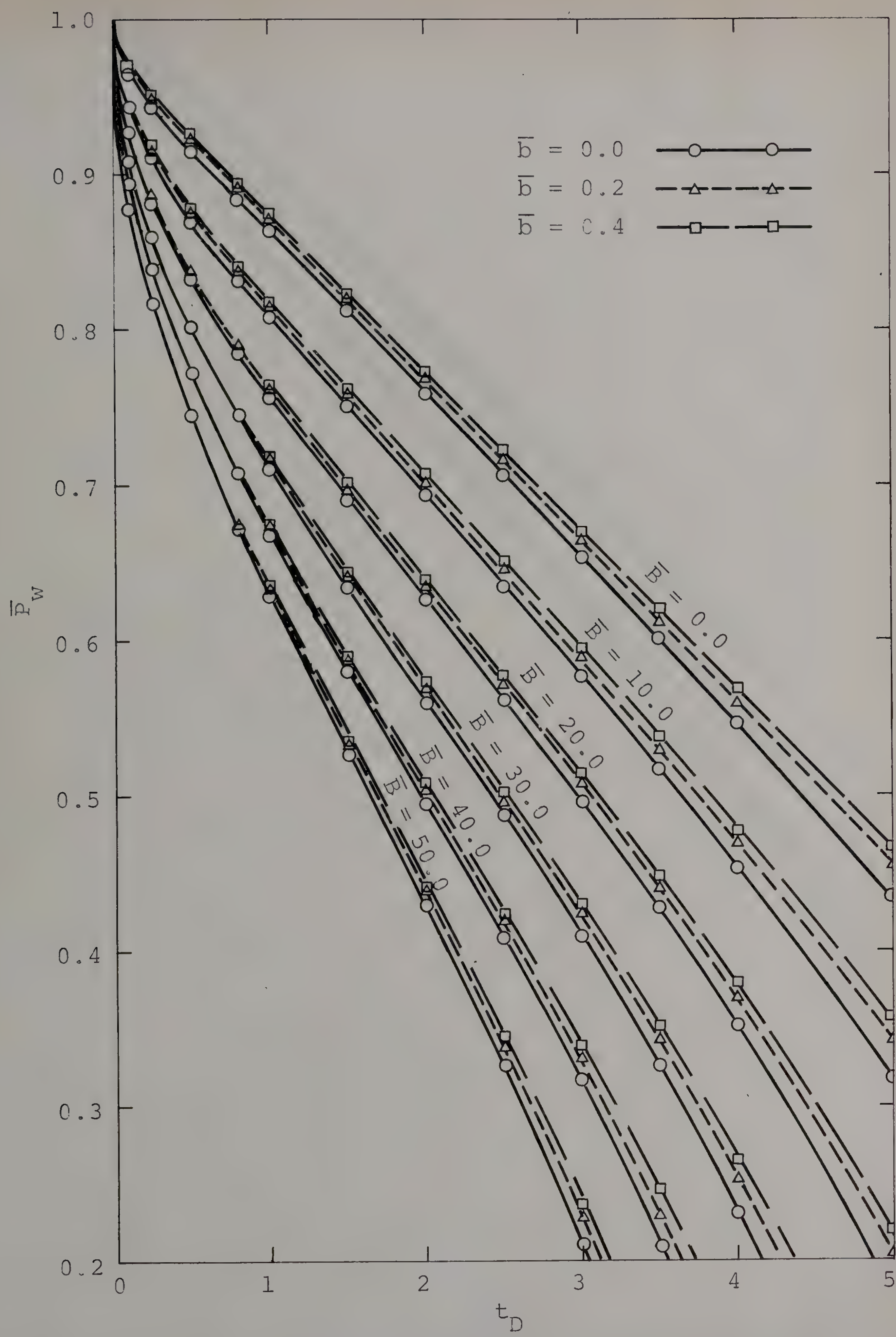


Figure 24. Effect of $\bar{B}$ and $\bar{b}$ on Outlet Pressure $(\overline{\rho q_x}) = -0.10$

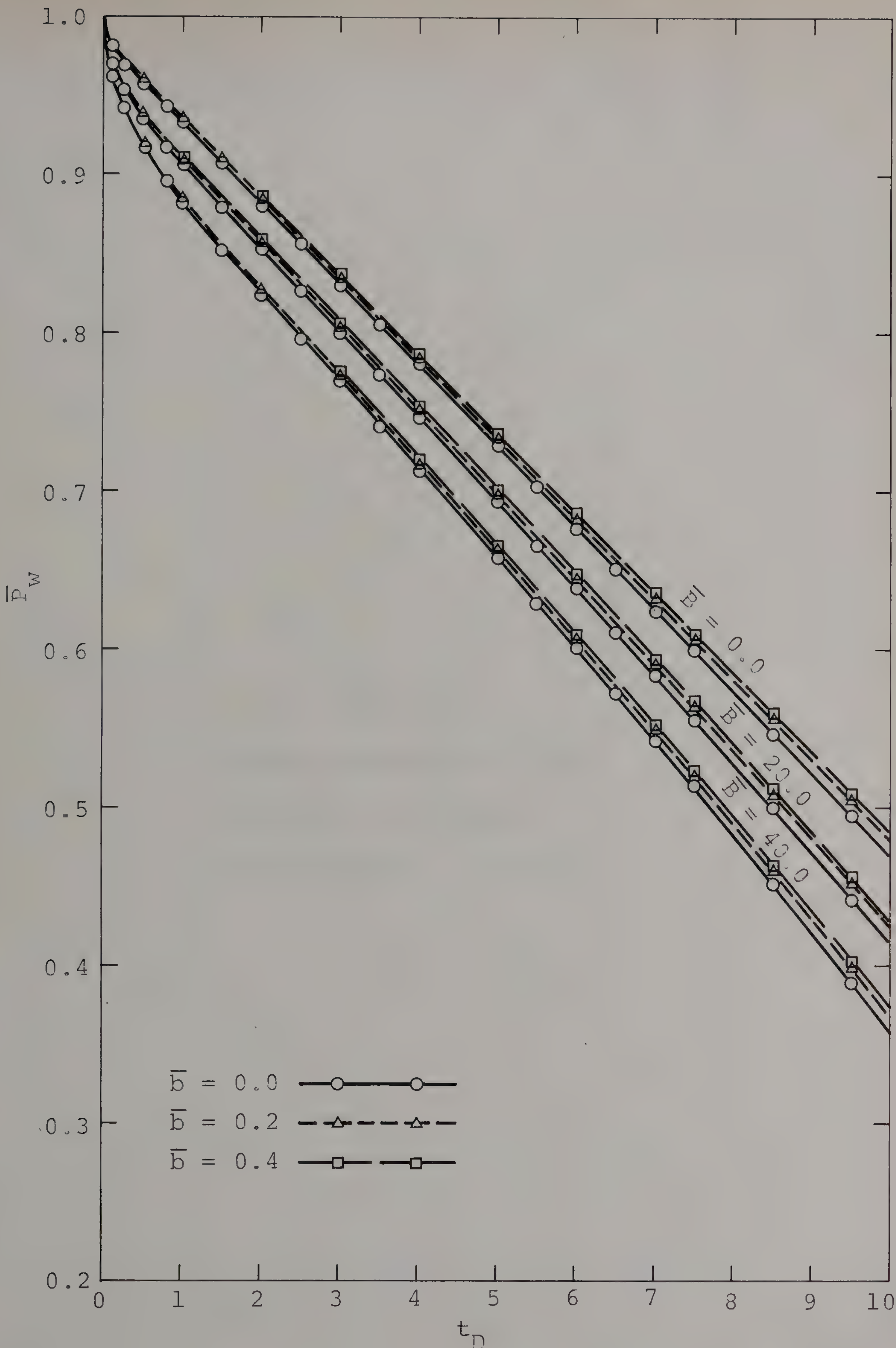


Figure 25. Effect of $\overline{B}$ and $\overline{b}$ on Outlet Pressure
$(\overline{\rho q_x}) = -0.05$

CASE III

CONSTANT PRESSURE AT THE PRODUCING FACE AND A SEALED EXTERNAL BOUNDARY

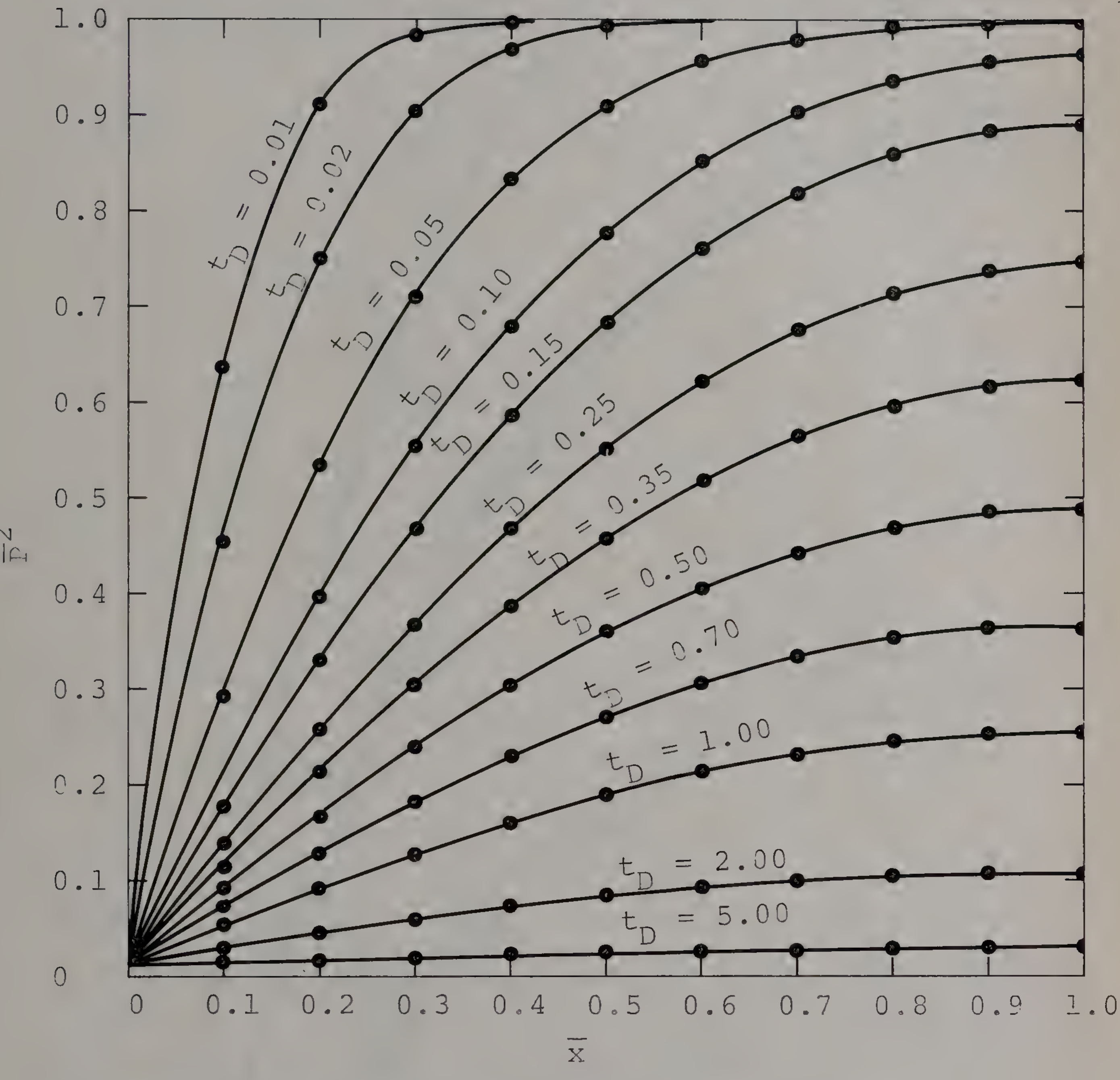


Figure 26. Pressure-Squared Distribution
$\bar{B} = 0.0$ and $\bar{b} = 0.0$ $\bar{P}_w = 0.10$

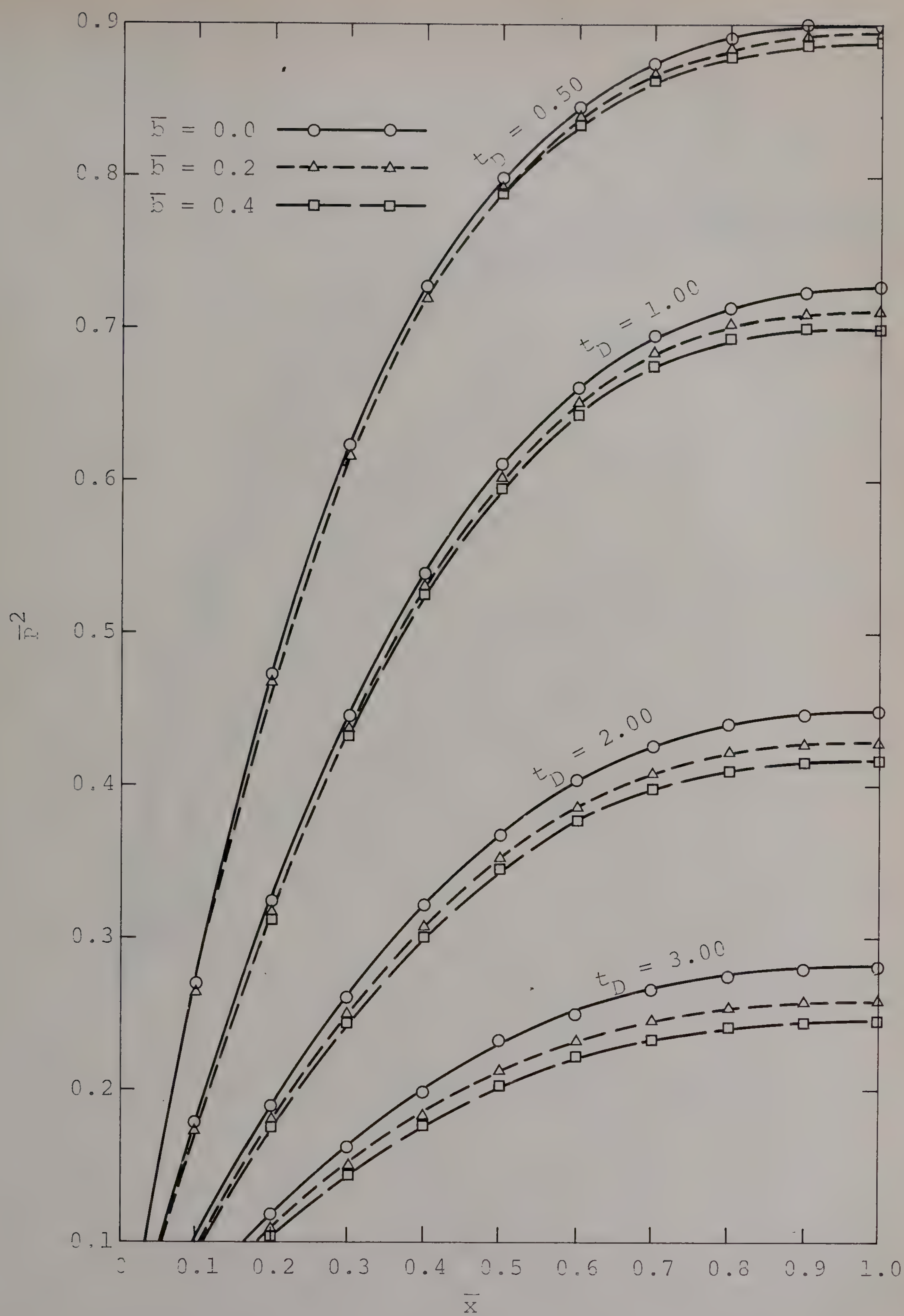


Figure 27. Effect of $\overline{b}$ on Pressure-Squared Distribution $\overline{B} = 10.0$ $\overline{P}_w = 0.10$

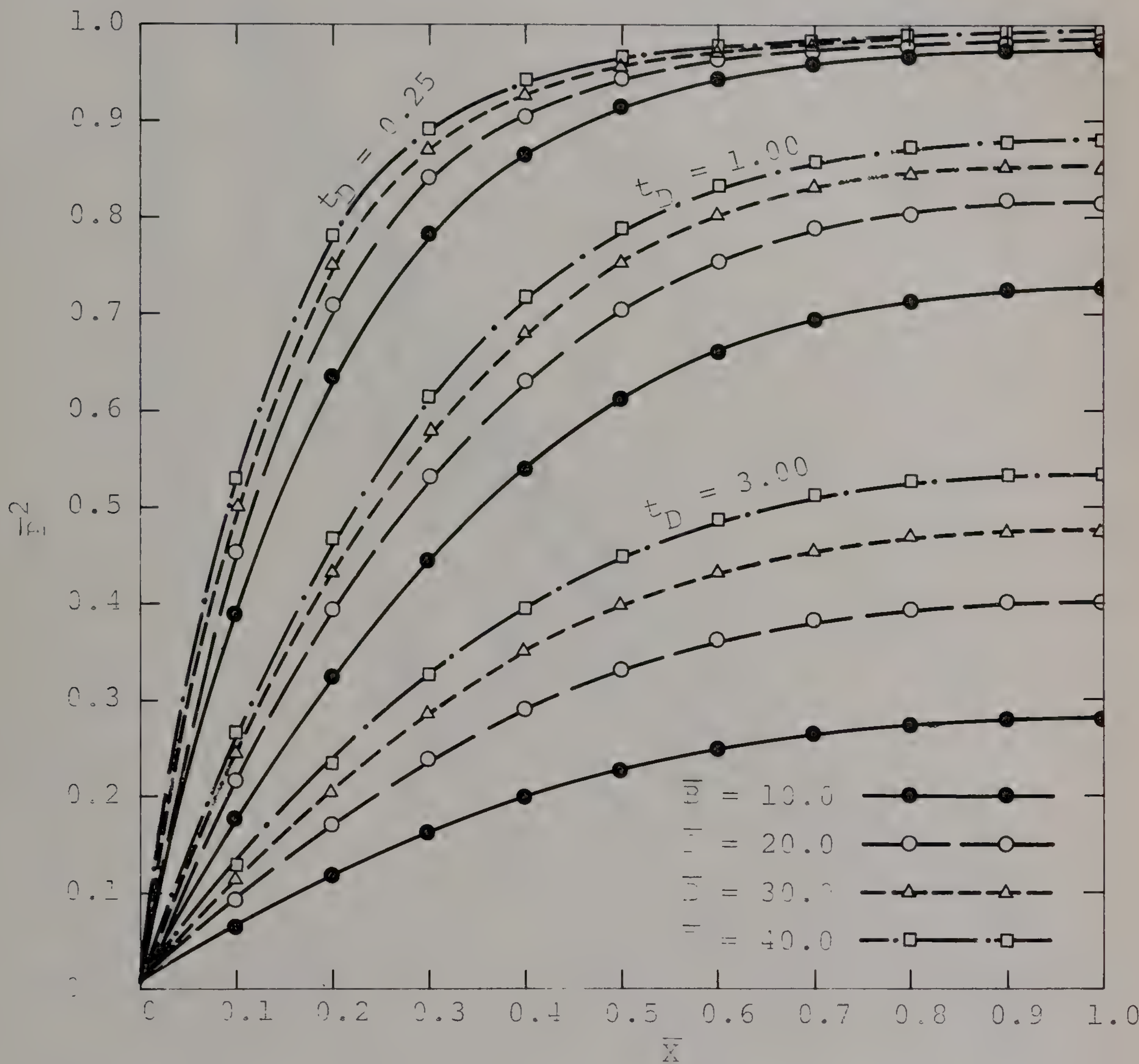


Figure 28. Effect of $\overline{B}$ on Pressure-Squared Distribution $\overline{b} = 0.0$ $\overline{P}_w = 0.10$

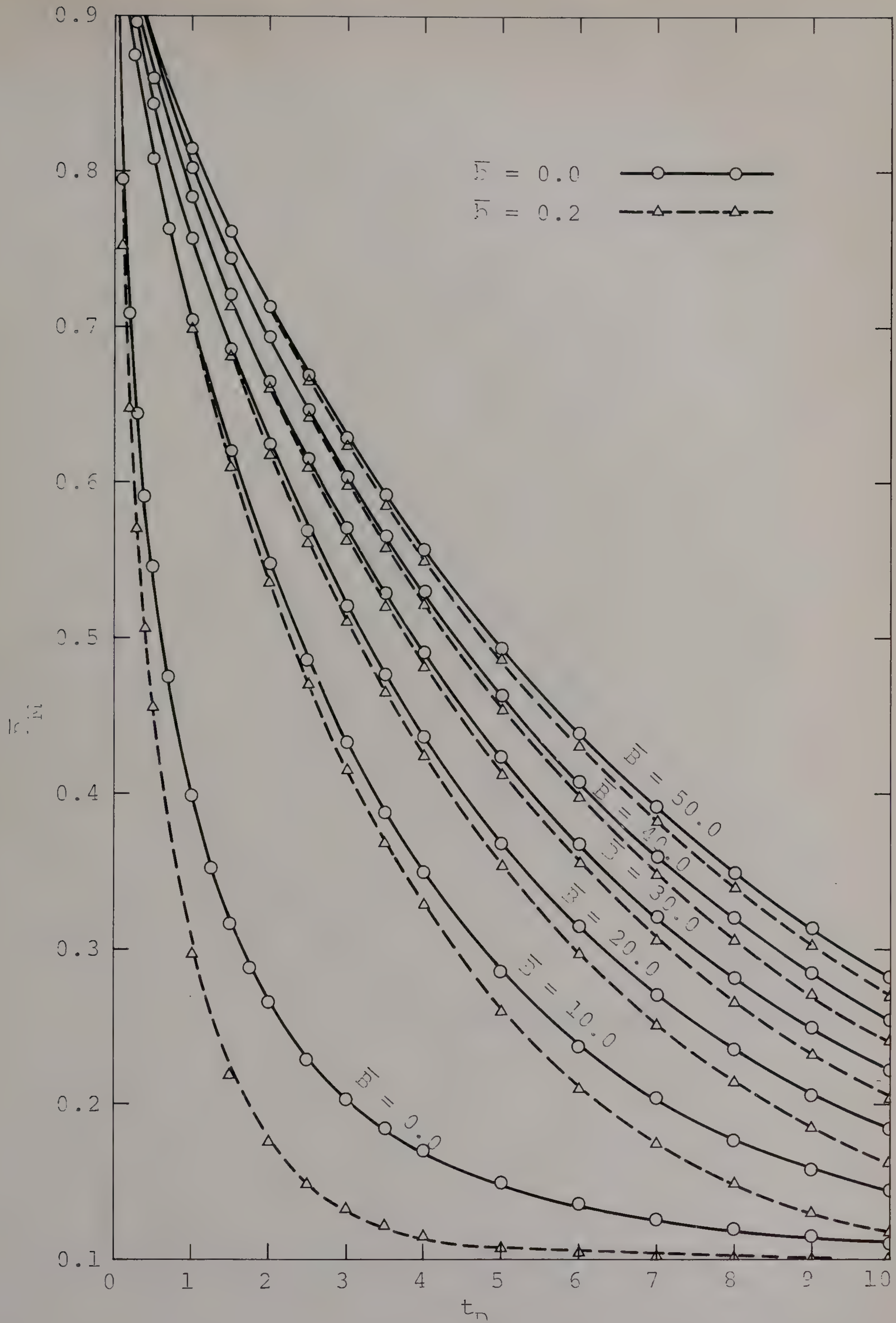


Figure 29. Effect of $\overline{B}$ and $\overline{b}$ on Mean Pressure $\overline{P}_w = 0.10$

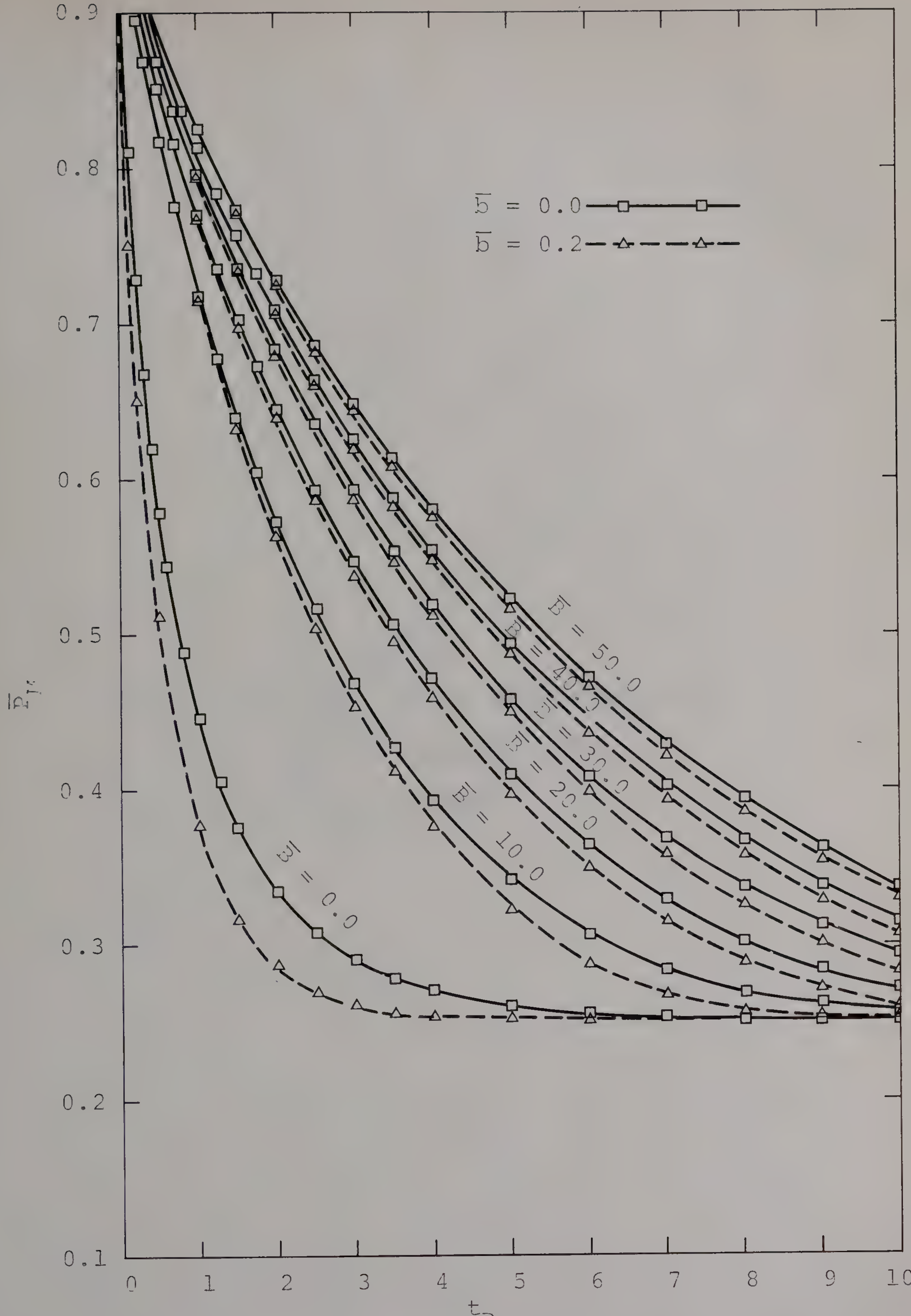


Figure 30. Effect of $\bar{B}$ and $\bar{b}$ on Mean Pressure
$\bar{P}_{w}$ = 0.25

CASE IV

CONSTANT PRESSURE AT THE PRODUCING FACE

AND A CONSTANT PRESSURE AT THE

EXTERNAL BOUNDARY

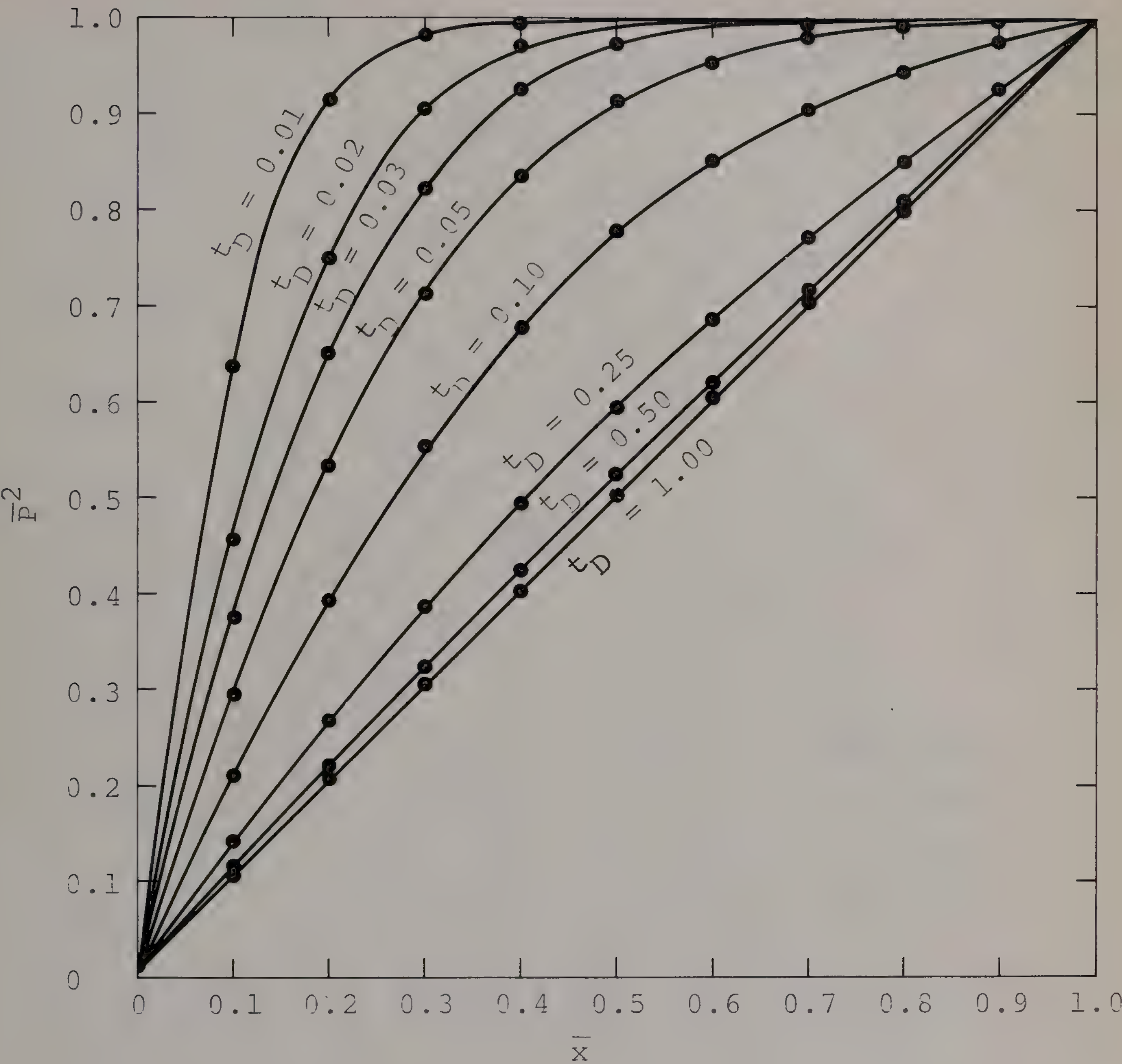


Figure 31. Pressure-Squared Distribution
$\overline{B}$ = 0.0 and $\overline{b}$ = 0.0 $\overline{P}_w$ = 0.10

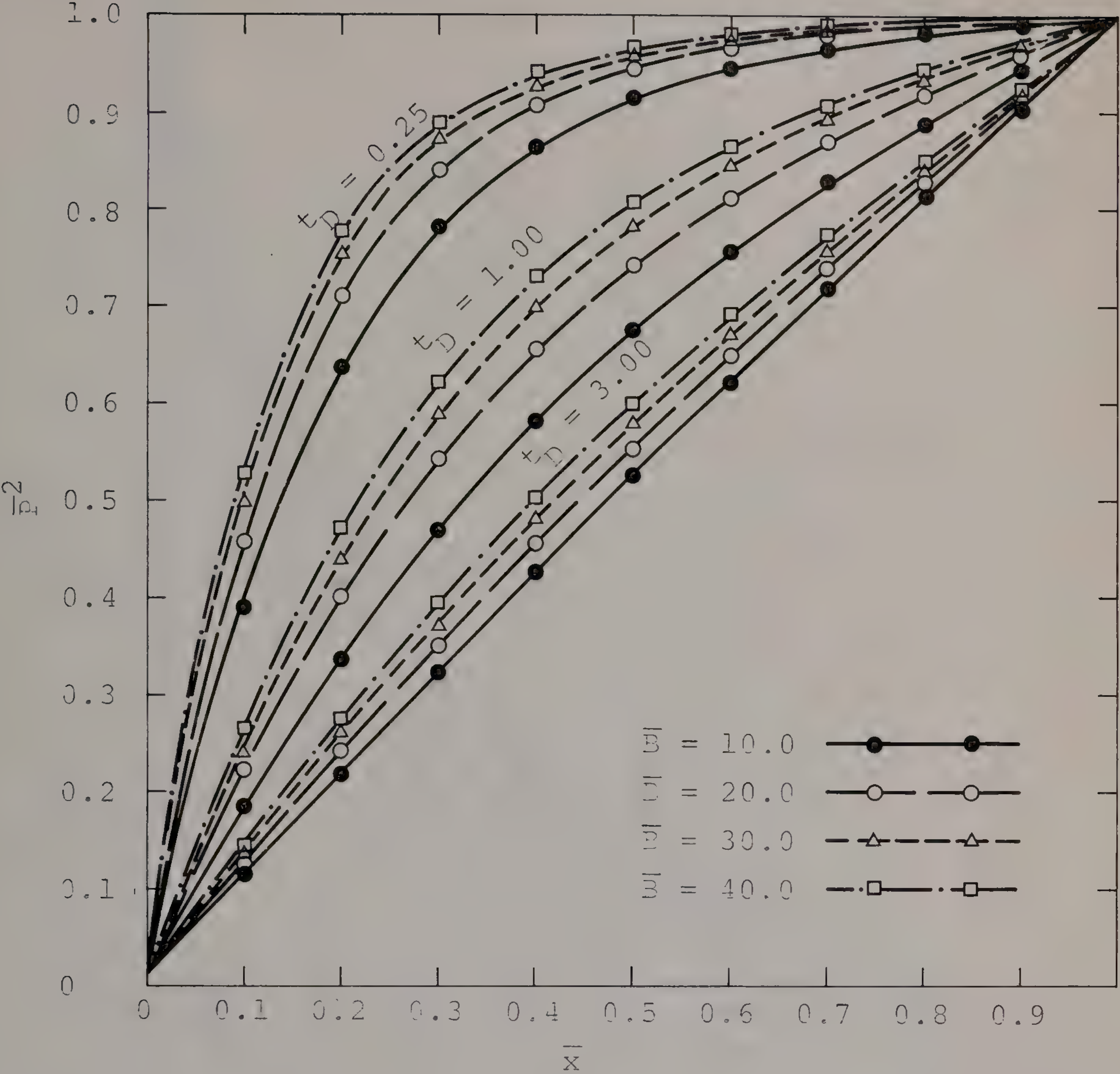


Figure 32. Effect of $\overline{B}$ on Pressure-Squared Distribution
$\overline{b} = 0.0$ $\overline{p}_w = 0.10$

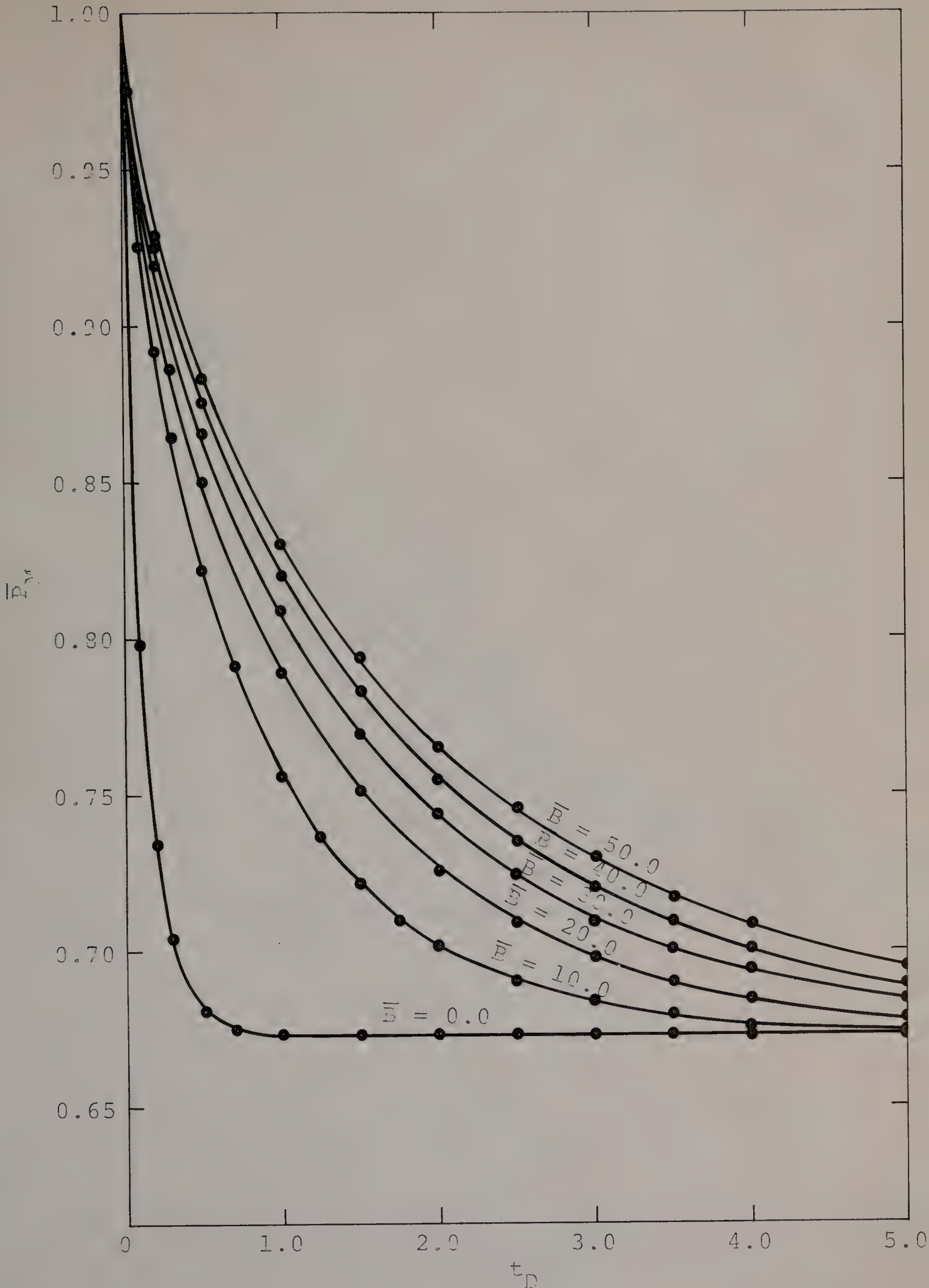


Figure 33. Effect of $\overline{B}$ on Mean Pressure
$\overline{b}$ = 0.0 $\overline{P}_W$ = 0.10

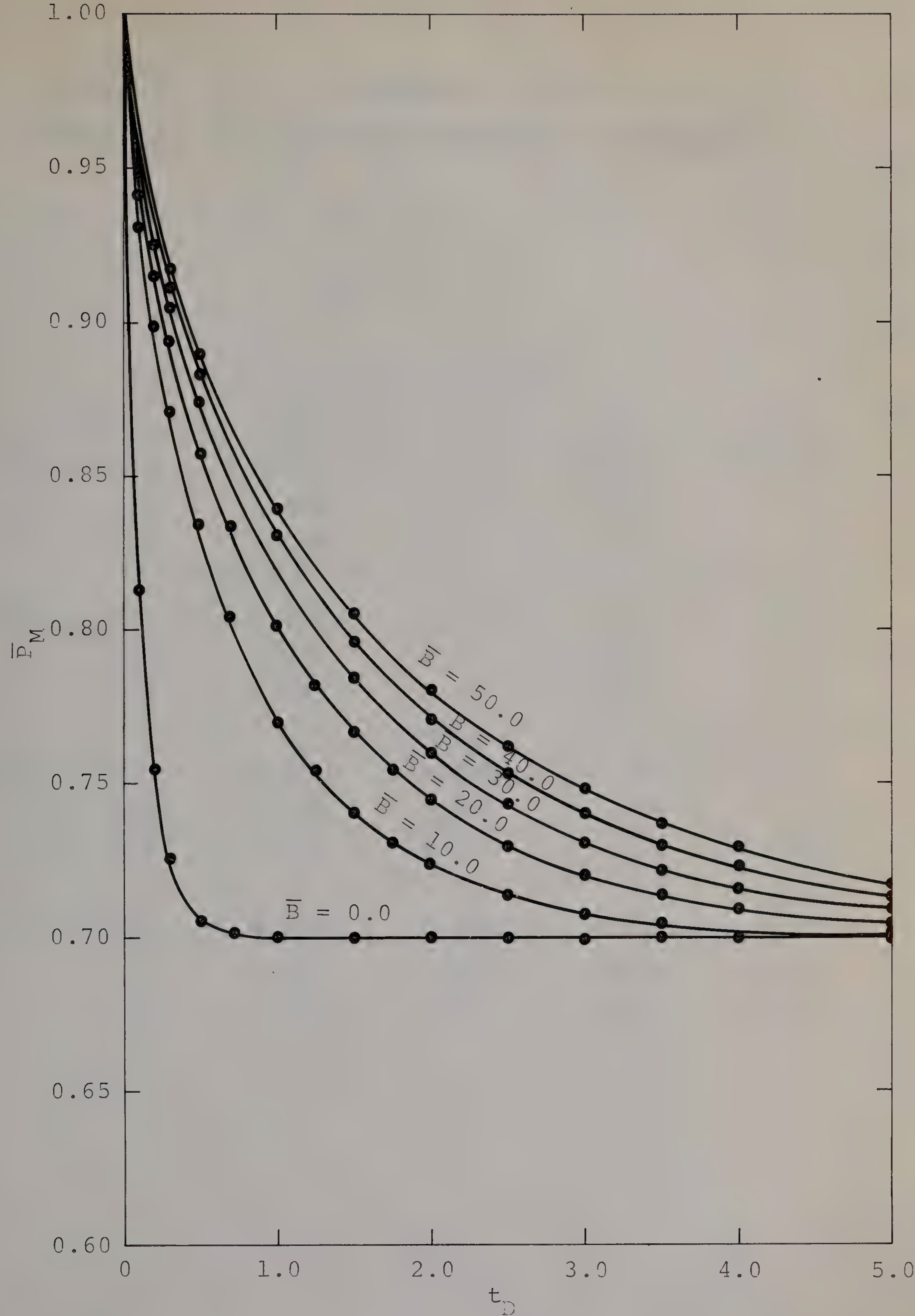


Figure 34. Effect of $\overline{B}$ on Mean Pressure
$\overline{b} = 0.0 \quad \overline{P}_W = 0.25$

Table 4

Effect of $\bar{b}$ on the Pressure-Squared Distribution

$\bar{B} = 10.0$

$\bar{P}_w = 0.10$

t_D	$\bar{b}$	$\bar{x}$ 0.20	0.40	0.60	0.80
0.25	0.0	0.637	0.866	0.947	0.980
	0.2	0.632	0.863	0.944	0.979
	0.4	0.629	0.861	0.943	0.978
0.50	0.0	0.475	0.736	0.870	0.946
	0.2	0.470	0.732	0.867	0.944
	0.4	0.467	0.729	0.865	0.943
1.00	0.0	0.337	0.583	0.757	0.888
	0.2	0.331	0.577	0.754	0.886
	0.4	0.329	0.575	0.752	0.885
3.00	0.0	0.221	0.426	0.622	0.812
	0.2	0.214	0.417	0.615	0.809
	0.4	0.212	0.415	0.613	0.807

C. Discussion of Material Balance Results

Table 5 summarizes the errors obtained in the material balance calculations which were performed on each of the four boundary conditions. The errors, which are of reasonable magnitude, are markedly smaller for the boundary conditions where the flow rates at the boundaries are known and need not be calculated. This would suggest that the flow rate calculations are the prime source of error in the numerical procedure employed.

Material balance errors will also be introduced by approximating the definite integrals by discrete equations, as can be seen in Appendix C.

Problems were once again encountered with Cases III and IV, when the inertial effects were set to zero and the slippage effects were not. Material balance errors increased considerably. This can be attributed to the fact that the solutions had not converged, as previously mentioned on page 42.

Table 5

Range of Material Balance Percentage Errors

Case	$\overline{b}$	Dimensionless Inertial Coefficient ($\overline{B}$) 0.0	10.0	30.0	50.0
I					
$(\overline{\rho q_x}) = -0.10$	0.0	(0.0 - 0.01)%	0.09 - 0.17	0.28 - 0.37	0.48 - 0.50
	0.2	0.0 - 0.06	0.11 - 0.18	0.35 - 0.46	0.59 - 0.63
	0.4	0.0 - 0.02	0.13 - 0.20	0.41 - 0.54	0.69 - 0.76
II					
$(\overline{\rho q_x}) = -0.10$	0.0	0.01 - 0.05	0.10 - 0.14	0.30 - 0.42	0.50 - 0.66
	0.2	0.01 - 0.07	0.12 - 0.17	0.36 - 0.51	0.60 - 0.81
	0.4	0.00 - 0.06	0.14 - 0.20	0.42 - 0.59	0.71 - 0.95
III					
$\overline{P}_w = 0.10$	0.0	0.40 - 0.52	2.27 - 2.69	2.33 - 2.50	2.34 - 2.57
	0.2	22.50 - 101.29	2.11 - 2.53	2.39 - 2.66	2.46 - 2.70
	0.4	37.13 - 224.11	2.43 - 2.71	2.49 - 2.83	2.55 - 2.92
IV					
$\overline{P}_w = 0.10$	0.0	0.12 - 0.40	2.31 - 2.54	2.36 - 2.60	2.38 - 2.60
	0.2	18.59 - 133.71	0.03 - 2.60	1.72 - 2.74	2.12 - 2.78
	0.4	27.90 - 116.64	0.99 - 2.79	2.27 - 2.91	2.56 - 2.95

CONCLUSIONS

In view of the studies undertaken in this investigation and the results that were obtained, the following conclusions can be formulated:

1. The linear Forchheimer equation describing steady horizontal gas flow through porous media can be derived from the Navier-Stokes equation of motion by a procedure similar to that employed by Hubbert, but extended to include inertial effects.
2. The equation thus obtained can be modified to describe plane radial flow.
3. A mathematical model which accounts for inertial and molecular streaming effects can be developed to describe transient isothermal gas flow in linear horizontal and plane radial porous systems.
4. The mathematical model for the finite linear system can be solved numerically to yield stable and convergent solutions for the four sets of boundary conditions that were considered. The numerical method employs the Crank-Nicholson Implicit procedure, together with a function iteration scheme.
5. Inertial effects contribute another resistance to gas flow through a porous system and therefore increase the slopes of the pressure-squared distributions in the reservoir.

6. Molecular streaming decreases the flow resistance and therefore decreases the slopes of the pressure-squared distributions. Consequently the effects tend to cancel one another.
7. In the study of transient isothermal gas flow through porous media, neither the inertial nor the molecular streaming effects can be neglected without some former investigations to establish that they are indeed negligible.

RECOMMENDATIONS

The following recommendations are made:

1. The results for the finite linear system should be verified empirically by running laboratory tests for each of the four boundary conditions considered. Care should be taken to use homogeneous samples.
2. The model describing transient isothermal gas flow through a plane radial system should be solved by a numerical technique similar to the one employed on the linear horizontal system. If stability problems are encountered, a Backward Difference Implicit procedure, which is less accurate but more stable, should be attempted.
3. The mathematical model for the two systems should be extended to include an absolute permeability which varies with distance. This would, however, present problems in combining the modified Forchheimer equation with the equation of continuity because absolute permeability would have to be treated as a variable.
4. The procedure could also be extended to include gases whose viscosity and compressibility factor vary with pressure. A procedure similar to that of Al-Hussainy et al[40] could be employed to allow for these additional variables.

5. Both the linear and the radial systems should be solved for infinite reservoirs as well as finite reservoirs. This would exhaust most of the common boundary conditions that are encountered in the two porous systems that were studied.
6. More accurate numerical integration schemes should be employed on the definite integrals in Appendix C in order to reduce computational errors in the material balance.

NOMENCLATURE

A	total cross-sectional area (L^2)
$\bar{B}$	dimensionless inertial resistance coefficient
C, D, E	dimensionless nonlinear terms in PDE
F_a	viscous resistance coefficient (L^{-2})
F_b	inertial resistance coefficient (L^{-1})
F_I	inertial forces
F_P	pressure forces
F_V	viscous forces
H	total height of sand filter (L)
J_h	hydraulic gradient (F/L)
K	proportionality constant
L	overall length of linear system (L)
M	molecular weight (m)
$[M]$	matrix of nonlinear terms
N_S, N_{S_1}, N_{S_2}	shape factors (unitless)
P	pressure (F/L^2)
R	universal gas constant (FL/T)
S	surface area (L^2)
T	temperature (T)
V	volume of the porous system (L^3)
W	mass (m)
W_p	cumulative mass produced (m)
$\vec{a}$	vector of known terms in the finite difference equation
b	Klinkenberg b-factor (F/L^2)

$\bar{b}$	dimensionless slip coefficient
c_o	$M/z_{ave}RT$ (M/FL)
c_1, c_2, c_3, c_4	specified constants (units vary)
c_w	constant terminal mass flow rate (M/tL^2)
d_c	characteristic length parameter of porous media (L)
d_p	mean particle diameter (L)
g	gravitational acceleration (L/t^2)
g_c	conversion factor (L_m/Ft^2)
h	formation thickness
h_1, h_2	fluid heights in manometers terminating below and above sand filter
k	absolute (liquid) permeability (L^2)
k_a	apparent permeability (L^2)
q	superficial fluid velocity based on the total cross-sectional area (L/t)
$\hat{q}(t)$	time-dependent part of (q)
r	radius (L)
r_c	radius of a capillary (L)
t	time (t)
t_D	dimensionless time
u	dimensionless pressure-squared
v	microscopic flow velocity (L/t)
w	mass flow rate (M/t)
z	gas compressibility factor
(ρq)	mass flow rate per total cross-sectional area (M/tL^2)

x,y,z	distances along the respective rectangular coordinates
α	proportionality constant that results from integration of viscous terms (L^{-2})
β	proportionality constant that results from integration of inertial terms (L^{-1})
λ_{ave}	mean free path length of a gas (L)
μ	viscosity (m/Lt)
ν	kinematic viscosity (L^2/t)
ξ	dimensionless length parameter (= ln $\bar{r}$)
ρ	density (m/L^3)
ϕ	porosity (unitless)

<u>Subscripts</u>

x,y,z	denote the direction in rectangular coordinates
i	denotes initial conditions
ℓ	grid point index along length
m	grid point index along time
s	denotes standard conditions
ave	denotes an average value
f	denotes reservoir (formation) conditions

<u>Superscripts</u>

$\longrightarrow$	denotes vector quantity
——	denotes a dimensionless variable as per Equations (B-9) and (B-23)
k	iteration number index

Mathematical Notation

∇	del operator
grad P	gradient of the scalar (P)
div $\vec{v}$	divergence of the vector ($\vec{v}$)
$D\vec{v}/Dt$	substantive derivative of the vector ($\vec{v}$)
$u_{\overline{xx}}, u_{\overline{rr}}, u_{\xi\xi}$	denote the second-order partial derivatives of (u) with respect to $\overline{x}$, $\overline{r}$, ξ
$u_{\overline{x}}$, $u_{\overline{r}}$, u_{ξ}	denote the first-order partial derivatives of (u) with respect to $\overline{x}$, $\overline{r}$, ξ

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A P P E N D I X   A

DERIVATION OF THE FORCHHEIMER EQUATIONS
AND
THE GENERAL CONTINUITY EQUATION

I. <u>Derivation of the Linear Forchheimer Equation</u>

The microscopic Navier-Stokes equation of motion in the x-direction can be written as:

$$(\rho^2 g_x - \rho \frac{\partial P}{\partial x}) = \rho^2 (\frac{Dv_x}{Dt}) - \mu\rho \left[(\frac{\partial^2 v_x}{\partial x^2} + \frac{\partial^2 v_x}{\partial y^2} + \frac{\partial^2 v_x}{\partial z^2}) + \frac{1}{3} \frac{\partial}{\partial x} (\frac{\partial v_x}{\partial x} + \frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z}) \right] \qquad \text{(A-1)}$$

The assumptions inherent in this equation are

a. Laminar flow

b. Isothermal flow

c. Newtonian fluid

d. The continuous flow channel is saturated with a pure fluid.

If it is further assumed that

e. Flow is horizontal

f. Flow is steady state

g.. An applicable equation of state is $\rho = c_o P$

then Equation (A-1) can be rewritten as

$$- \frac{c_o}{2} \frac{\partial P^2}{\partial x} = \rho^2 (v_x \frac{\partial v_x}{\partial x} + v_y \frac{\partial v_x}{\partial y} + v_z \frac{\partial v_x}{\partial z}) - \mu\rho \left[(\frac{\partial^2 v_x}{\partial x^2} + \frac{\partial^2 v_x}{\partial y^2} + \frac{\partial^2 v_x}{\partial z^2}) + \frac{1}{3} \frac{\partial}{\partial x} (\frac{\partial v_x}{\partial x} + \frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z}) \right] \qquad \text{(A-2a)}$$

[illegible]

The grouping of the forces permits Equation (A-2a) to be written as

$$(dF_P) \;=\; (dF_I) + (dF_V) \tag{A-2b}$$

In the following treatment viscosity is considered constant and flow is considered to occur through any porous media which is homogeneous and isotropic with respect to porosity and permeability. It is obvious that Equation (A-2b) rewritten in terms of macroscopic variables should consist of a pressure-squared gradient which is dependent on two terms, namely:

1. A viscous term which is linearly proportional to a macroscopic flow velocity
2. An inertial term which is proportional to the square of some macroscopic flow velocity.

It is possible to define a macroscopic volume element, $\Delta\overline{V} = \Delta x \Delta y \Delta z$, which is large enough so that the properties of the porous medium do not vary from macroscopic element to macroscopic element and small enough so that the flow of a fluid through the medium is seen as a continuous phenomenon in space.

A macroscopic fluid velocity in the x-direction will be defined according to the following equation:

$$q_x = \frac{\int_{\phi\Delta y\Delta z} v_x \, dA}{\int_{\Delta y\Delta z} dA}$$

$$= \frac{(v_x)_{\text{ave(over } \phi\Delta y\Delta z)} \, (\phi\Delta y\Delta z)}{\Delta y\Delta z} \qquad \text{(A-3)}$$

Therefore,

$$q_x = \phi (v_x)_{\text{ave(over } \phi\Delta y\Delta z)} \qquad \text{(A-4)}$$

Furthermore, consider macroscopic flow to occur parallel to the x-axis only.

The procedure employed to convert the microscopic variables involves integrating the terms in the microscopic Navier-Stokes equation over the macroscopic volume element in order to obtain volumetric averages for the forces in question. This method is similar to that employed by M. King Hubbert and extends the treatment to include inertial forces.

a. <u>Pressure Forces</u>

$$(dF_P)_{\text{ave}} = \frac{-\frac{c_o}{2} \int_{\phi\Delta V} \left(\frac{\partial P^2}{\partial x}\right) dV}{\int_{\phi\Delta V} dV}$$

$$= -\frac{c_o}{2} \left(\frac{\partial P^2}{\partial x}\right)_{\text{ave(over } \phi\Delta V)} \qquad \text{(A-5)}$$

or

$$(dF_P)_{ave} = -\frac{c_o}{2}\left(\frac{\partial P^2}{\partial x}\right) \qquad \text{(A-6)}$$

It should be noted that the pressure-squared gradient in Equation (A-6) is the macroscopic pressure-squared gradient and is equivalent to the volumetric average of the gradients at every point of the fluid contained in the macroscopic volume element.

b. Inertial Terms

$$(dF_I)_{ave} = \frac{\int_{\phi \Delta V} \rho^2 \left(v_x \frac{\partial v_x}{\partial x} + v_y \frac{\partial v_x}{\partial y} + v_z \frac{\partial v_x}{\partial z}\right) dV}{\int_{\phi \Delta V} dV} \qquad \text{(A-7)}$$

Consider density to be a function of x only. Furthermore, rewrite the derivatives in the above equation to include v_x^2. Equation (A-7) becomes:

$$(dF_I)_{ave} = \frac{\frac{1}{2}\int_{\Delta x} \rho^2 \left[\int\int_{\phi \Delta y \Delta z} \left(\frac{\partial v_x^2}{\partial x} + \frac{v_y}{v_x}\frac{\partial v_x^2}{\partial y} + \frac{v_z}{v_x}\frac{\partial v_x^2}{\partial z}\right) dydz\right] dx}{\int_{\phi \Delta V} dV} \qquad \text{(A-8)}$$

The first term in the above equation indicates the gradient, in the x-direction, of the microscopic velocity, v_x^2, and is dependent on three phenomena, namely:

1. Expansion and contraction of the flow channels
2. The change in direction of the flow channels
3. Pressure drop in the x-direction which causes the fluid to expand and the velocity to increase.

The remaining two terms would be zero if flow was restricted to a capillary oriented in the x-direction, because v_y and v_z would then be zero everywhere. However, in a porous medium this is the case only when flow is microscopically in the x-direction. Everywhere else these two velocities exist. Since $(\partial v_x^2/\partial y)$ and $(\partial v_x^2/\partial z)$ have finite values everywhere in the macroscopic volume element, the last two terms in Equation (A-8) cannot be neglected. The three inertial terms will now be treated.

Term 1:

$$(dF_{I_1})_{ave} = \frac{\frac{1}{2}\int_{\Delta x} \rho^2 \left[\iint_{\phi\Delta y\Delta z} \left(\frac{\partial v_x^2}{\partial x}\right) dydz\right] dx}{\int_{\Delta V} dV} \tag{A-9}$$

$$= \frac{\frac{1}{2}\int \rho^2 \left(\frac{\partial v_x^2}{\partial x}\right)_{ave(over\ \phi\Delta y\Delta z)} dx}{\int_{\Delta x} dx} \tag{A-10}$$

Assume that

$$\left(\frac{\partial v_x^2}{\partial x}\right)_{ave(over\ \phi\Delta y\Delta z)} \approx \frac{\partial (v_x^2)_{ave(over\ \phi\Delta y\Delta z)}}{\partial x} \tag{A-11}$$

This assumption states that the average value of the velocity-squared gradient at every point in the cross-sectional area normal to the flow direction is approximately equal to the gradient of the average velocity-squared at this cross-section.

In view of Equation (A-4), the following equation may be written:

$$\frac{\partial (v_x)^2_{ave(over\ \phi\Delta y\Delta z)}}{x} = \frac{1}{\phi^2}\ \frac{\partial q_x{}^2}{\partial x} \tag{A-12}$$

$$= \frac{2}{\phi^2}\, q_x\, \frac{\partial q_x}{\partial x}$$

The term $(\partial q_x/\partial x)$ is the gradient of the macroscopic fluid velocity, q_x, in the direction of flow, and will vary from cross-section to cross-section. This term may be approximated by the following expression:

$$\frac{\partial q_x}{\partial x} \simeq \beta_1{}' q_x \tag{A-13}$$

where $\beta_1{}'$ and q_x are both functions of x. The proportionality constant at a certain cross-section, $\beta_1{}'$, accounts for the operator $\partial/\partial x$ and must obviously contain dimensions of (L^{-1}). Because the gradient of q_x is negative for production and positive for injection, the sign associated with $\beta_1{}'$ will be negative and positive respectively. Similarly, because q_x is negative for production and positive for injection, the

product of the two terms, $\beta_1 ' q_x$, will remain positive for both production and injection. It is customary to specify the inertial resistance coefficient, which results directly from $\beta_1 '$, as positive for both production and injection. Therefore, if $\beta_1 '$ is specified as positive, an absolute value of the macroscopic flow rate must be used in order to retain a product which is always positive. As a result, it is possible to rewrite Equation (A-13) as:

$$\frac{\partial q_x}{\partial x} \approx \beta_1 ' |q_x| \tag{A-14}$$

where $\beta_1 '$ is positive for production and injection.

Employing Equations (A-11), (A-12), and (A-14), Equation (A-10) can be rewritten as:

$$(dF_{I_1})_{ave} \approx \frac{\frac{1}{\phi^2} \int_{\Delta x} \beta_1 ' \rho^2 q_x |q_x| dx}{\int_{\Delta x} dx} \tag{A-15}$$

Since the macroscopic mass flow rate per total cross-sectional area, ρq_x, is constant with respect to x, it is possible to rewrite Equation (A-15) as:

$$(dF_{I_1})_{ave} \approx \frac{1}{\phi^2} (\rho q_x) |\rho q_x| \frac{\int_{\Delta x} \beta_1 ' dx}{\int_{\Delta x} dx} \tag{A-16}$$

Integrating with respect to x, the following result is obtained:

$$(dF_{I_1})_{ave} \approx \frac{\beta_1}{\phi^2} (\rho q_x) |\rho q_x| \tag{A-17}$$

The proportionality constant β_1 is the average value of β_1' with respect to x, and therefore characterizes the entire macroscopic volume element over which integration was performed.

Terms 2 and 3:

$$(dF_{I_2})_{ave} + (dF_{I_3})_{ave} = \frac{\frac{1}{2}\int_{\Delta x} \rho^2 \left[\iint_{\phi\Delta y\Delta z} \left(\frac{v_y}{v_x}\frac{\partial v_x{}^2}{\partial y} + \frac{v_z}{v_x}\frac{\partial v_x{}^2}{\partial z}\right) dydz\right] dx}{\int_{\phi\Delta V} dV} \tag{A-18}$$

$$= \frac{\frac{1}{2}\int_{\Delta x} \rho^2 \left[\left(\frac{v_y}{v_x}\frac{\partial v_x{}^2}{\partial y}\right)_{ave\,(over\ \phi\Delta y\Delta z)} + \left(\frac{v_z}{v_x}\frac{\partial v_x{}^2}{\partial z}\right)_{ave\,(over\ \phi\Delta y\Delta z)}\right] dx}{\int_{\Delta x} dx} \tag{A-19}$$

The complexity of the terms $\left(\frac{v_y}{v_x}\frac{\partial v_x{}^2}{\partial y}\right)_{ave}$ and $\left(\frac{v_z}{v_x}\frac{\partial v_x{}^2}{\partial z}\right)_{ave}$ makes it impossible to rigorously obtain the macroscopic flow velocity, q_x, from these terms even though it is obvious that the terms should yield some function of $q_x{}^2$. In view of this, it may be postulated that the following two assumptions are reasonable:

$$\left(\frac{v_y}{v_x}\frac{\partial v_x{}^2}{\partial y}\right)_{ave\,(over\ \phi\Delta y\Delta z)} \approx \beta_2' \frac{q_x{}^2}{\phi^2} \tag{A-20a}$$

$$\left(\frac{v_z}{v_x}\frac{\partial v_x{}^2}{\partial z}\right)_{ave\,(over\ \phi\Delta y\Delta z)} \approx \beta_3' \frac{q_x{}^2}{\phi^2} \tag{A-20b}$$

By virtue of the argument which validated the inclusion of the absolute sign in Equation (A-14), the following equations may be written as:

$$\beta_2' \frac{q_x^2}{\phi^2} = \frac{\beta_2'}{\phi^2} q_x|q_x| \qquad \text{(A-21a)}$$

$$\frac{\beta_3'}{\phi^2} q_x^2 = \frac{\beta_3'}{\phi^2} q_x|q_x| \qquad \text{(A-21b)}$$

Making use of Equations (A-20) and (A-21), Equation (A-19) can be written in this form:

$$(dF_{I_2})_{ave} + (dF_{I_3})_{ave} \approx \frac{1}{2\phi^2} \frac{\int_{\Delta x} \rho^2 q_x|q_x|(\beta_2'+\beta_3')dx}{\int_{\Delta x} dx} \qquad \text{(A-22)}$$

Because (ρq_x) is a constant with respect to x, this equation can be simplified to read:

$$(dF_{I_2})_{ave} + (dF_{I_3})_{ave} \approx \frac{(\rho q_x)|\rho q_x|}{2\phi^2} \frac{\int_{\Delta x}(\beta_2'+\beta_3')dx}{\int_{\Delta x} dx} \qquad \text{(A-23)}$$

$$\approx \frac{(\beta_2 + \beta_3)}{2\phi^2} (\rho q_x)|\rho q_x| \qquad \text{(A-24)}$$

Combining the three inertial terms into one yields Equation (A-25):

$$(dF_I)_{ave} \approx \frac{(\rho q_x)|\rho q_x|}{\phi^2} (\beta_1 + \frac{\beta_2 + \beta_3}{2}) \qquad \text{(A-25)}$$

Lumping all three proportionality constants into one, Equation (A-25) will become:

$$(dF_I)_{ave} \approx \frac{\beta}{\phi^2} (\rho q_x)|\rho q_x| \tag{A-26}$$

The extreme complexity of the proportionality constant, β, should be appreciated. It includes the dimensions of (L^{-1}), but the individual proportionality constants that comprise it have a length dimension each in a different coordinate direction (i.e. x, y, and z). It cannot be written in terms of one length parameter, but as some combination of all three which will yield dimensions of (L^{-1}).

c. Viscous Terms

$$(dF_V)_{ave} = \frac{-\mu \int_{\phi\Delta V} \rho \left[\left(\frac{4}{3} \frac{\partial^2 v_x}{\partial x^2} + \frac{\partial^2 v_x}{\partial y^2} + \frac{\partial^2 v_x}{\partial z^2}\right) + \frac{1}{3} \frac{\partial}{\partial x}\left(\frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z}\right) \right] dV}{\int_{\phi\Delta V} dV} \tag{A-27}$$

Examining the last two terms first, and considering density a function of x only, the following equation may be written:

$$\frac{\frac{-\mu}{3} \int_{\phi\Delta V} \rho \frac{\partial}{\partial x}\left(\frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z}\right) dV}{\int_{\phi\Delta V} dV} = \frac{\frac{-\mu}{3} \int_{\Delta x} \rho \left[\iint_{\phi\Delta y\Delta z} \left(\frac{\partial^2 v_y}{\partial x\partial y} + \frac{\partial^2 v_z}{\partial x\partial z}\right) dydz \right] dx}{\int_{\phi\Delta V} dV} \tag{A-28}$$

$$= \frac{\frac{-\mu}{3} \int_{\Delta x} \rho \left[\left(\frac{\partial^2 v_y}{\partial x\partial y}\right)_{\text{ave(over } \phi\Delta y\Delta z)} + \left(\frac{\partial^2 v_z}{\partial x\partial z}\right)_{\text{ave(over } \phi\Delta y\Delta z)} \right] dx}{\int_{\Delta x} dx}$$

As in Equation (A-11) it may be assumed that the following statements are valid:

$$\left(\frac{\partial^2 v_y}{\partial x \partial y}\right)_{ave(over\ \phi\Delta y\Delta z)} \approx \frac{\partial^2 (v_y)_{ave(over\ \phi\Delta y\Delta z)}}{\partial x \partial y} \quad \text{(A-29a)}$$

$$\left(\frac{\partial^2 v_z}{\partial x \partial z}\right)_{ave(over\ \phi\Delta y\Delta z)} \approx \frac{\partial^2 (v_z)_{ave(over\ \phi\Delta y\Delta z)}}{\partial x \partial z} \quad \text{(A-29b)}$$

But, because it has been specified that macroscopic flow is parallel to the x-axis only, the average values of the transversal velocities, v_y and v_z, are zero for any cross-section normally to flow. Therefore, it can be concluded that $(\partial^2 v_y/\partial x\partial y)_{ave(over\ \phi\Delta y\Delta z)}$ and $(\partial^2 v_z/\partial x\partial z)_{ave(over\ \phi\Delta y\Delta z)}$ are approximately equal to zero and, as a result, the last two terms in Equation (A-27) can be neglected. This agrees with results obtained by Hubbert[41] and Irmay[42].

Now consider the remaining three viscous terms.

$$(dF_V)_{ave} = \frac{-\mu \int_{\Delta x} \rho \left[\iint_{\phi\Delta y\Delta z} \left(\frac{4}{3}\frac{\partial^2 v_x}{\partial x^2} + \frac{\partial^2 v_x}{\partial y^2} + \frac{\partial^2 v_x}{\partial z^2}\right) dydz\right] dx}{\int_{\phi\Delta V} dV} \quad \text{(A-30)}$$

$$(dF_V)_{ave} = -\mu \int_{\Delta x} \rho \left[\left(\frac{4}{3}\left(\frac{\partial^2 v_x}{\partial x^2}\right)_{ave(over\ \phi\Delta y\Delta z)} + \left(\frac{\partial^2 v_x}{\partial y^2}\right)_{ave(over\ \phi\Delta y\Delta z)} + \left(\frac{\partial^2 v_x}{\partial z^2}\right)_{ave(over\ \phi\Delta y\Delta z)}\right) dx\right] \Big/ \int_{\Delta x} dx$$

As before, it can be written that:

$$\left(\frac{\partial^2 v_x}{\partial x^2}\right)_{\substack{\text{ave} \\ (\text{wrt } \phi\Delta y\Delta z)}} \approx \frac{\partial^2 (v_x)_{\text{ave(over } \phi\Delta y\Delta z)}}{\partial x^2}$$

$$= \frac{1}{\phi}\frac{\partial^2 q_x}{\partial x^2} \tag{A-32a}$$

$$\left(\frac{\partial^2 v_x}{\partial y^2}\right)_{\substack{\text{ave} \\ (\text{wrt } \phi\Delta y\Delta z)}} \approx \frac{\partial^2 (v_x)_{\text{ave(over } \phi\Delta y\Delta z)}}{\partial y^2}$$

$$= \frac{1}{\phi}\frac{\partial^2 q_x}{\partial y^2} \tag{A-32b}$$

$$\left(\frac{\partial^2 v_x}{\partial z^2}\right)_{\substack{\text{ave} \\ (\text{wrt } \phi\Delta y\Delta z)}} \approx \frac{\partial^2 (v_x)_{\text{ave(over } \phi\Delta y\Delta z)}}{\partial z^2}$$

$$= \frac{1}{\phi}\frac{\partial^2 q_x}{\partial z^2} \tag{A-32c}$$

Using Equation (A-13) as a basis, the following approximations may be written:

$$\frac{\partial^2 q_x}{\partial x^2} \approx \alpha_1' q_x \tag{A-33a}$$

$$\frac{\partial^2 q_x}{\partial y^2} \approx \alpha_2' q_x \tag{A-33b}$$

$$\frac{\partial^2 q_x}{\partial z^2} \approx \alpha_3' q_x \tag{A-33c}$$

The proportionality constants α_1', α_2', and α_3' at the particular cross-section being considered account for the operators $\partial^2/\partial x^2$, $\partial^2/\partial y^2$, and $\partial^2/\partial z^2$, respectively, and must therefore have dimensions of (L^{-2}). As stated by Hubbert[43], large variations in the velocity, v_x, occur over a relatively small pore space. The values of α_2' and α_3' are thus expected to be large. Variations in v_x in the x-direction result primarily from the expansion of the fluid due to the pressure drop and the value of α_1' is expected to be much smaller. Therefore, it may be stated that:

$$\frac{\alpha_1' q_x}{\alpha_2' q_x} = \frac{\alpha_1'}{\alpha_2'} << 1 \qquad \text{(A-34a)}$$

$$\frac{\alpha_1' q_x}{\alpha_3' q_x} = \frac{\alpha_1'}{\alpha_3'} << 1 \qquad \text{(A-34b)}$$

Consequently, the term $\frac{4}{3}\frac{\partial^2 v_x}{\partial x^2}$ in Equation (A-30) may be neglected.

Employing Equations (A-32) and (A-33), Equation (A-31) may be rewritten as:

$$(dF_v)_{ave} \approx \frac{\frac{-\mu}{\phi}\int_{\Delta x} \rho q_x(\alpha_2' + \alpha_3')\,dx}{\int_{\Delta x} dx} \qquad \text{(A-35)}$$

$$\approx -\frac{(\alpha_2 + \alpha_3)}{\phi}\,\mu\,(\rho q_x)$$

If the proportionality constants, α_2 and α_3, are combined, the average viscous forces for the macroscopic volume element may be written as:

$$(dF_v)_{ave} \approx -\frac{\alpha}{\phi}\mu\,(\rho q_x) \tag{A-36}$$

This lumped proportionality constant contains two individual proportionality constants which have (L^{-2}) dimensions normal to the flow direction (i.e. y and z directions). It suggests a reciprocal of the cross-sectional area normal to the macroscopic flow direction. This would definitely imply permeability.

Employing Equations (A-6), (A-26), and (A-36), the microscopic Navier-Stokes equation may be rewritten in terms of macroscopic variables which correspond to volumetric averages. The result is Equation (A-37) stated below:

$$-\frac{c_o}{2}\left(\frac{\partial P^2}{\partial x}\right) = \frac{-\alpha}{\phi}\mu\,(\rho q_x) + \frac{\beta}{\phi^2}(\rho q_x)\,|\rho q_x| \tag{A-37}$$

The constants on the right hand side of Equation (A-37) may be lumped together in the following way:

$$\frac{-\alpha}{\phi} = \frac{1}{k_a} \tag{A-38a}$$

$$\frac{\beta}{\phi^2} = F_b \tag{A-38b}$$

The result will then yield the Forchheimer equation, which is written as:

$$-\frac{\partial P^2}{\partial x} = \frac{2}{c_o}\left[\frac{\mu}{k_a}(\rho q_x) + F_b(\rho q_x)|\rho q_x|\right] \tag{A-39}$$

It is identical to Equation (37).

The Forchheimer equation thus derived is valid only for that macroscopic volume element over which integration was performed. However, because the macroscopic volume element was chosen in such a way that it represented the entire homogeneous and isotropic porous medium, Equation (A-39) is valid for the entire porous system.

II. Modifying the Forchheimer Equation to Include Plane Radial Flow

It has been established that Equation (A-39) describes steady linear gas flow through homogeneous and isotropic porous media, when inertial effects are accounted for. In order to modify this equation to describe plane radial flow, coordinate transformations may be used. For horizontal flow Equation (A-39) may be written in vector notation as:

$$-\nabla P^2 = \frac{2}{c_o}\left[\frac{\mu}{k_a}(\rho\vec{q}) + F_b(\rho\vec{q})|\rho\vec{q}|\right] \tag{A-40}$$

In rectangular coordinates, the vector quantities become

$$\nabla P^2 = \vec{i}\,\frac{\partial P^2}{\partial x} + \vec{j}\,\frac{\partial P^2}{\partial y} + \vec{k}\,\frac{\partial P^2}{\partial z} \tag{A-41a}$$

$$\vec{q} = \vec{i}\,q_x + \vec{j}\,q_y + \vec{k}\,q_z \tag{A-41b}$$

For flow in the x-direction only, these expressions reduce to

$$\nabla P^2 = \vec{i} \frac{\partial P^2}{\partial x} \tag{A-42a}$$

$$\vec{q} = \vec{i}\, q_x \tag{A-42b}$$

In cylindrical coordinates, the same vector quantities may be expanded to yield:

$$\nabla P^2 = \vec{\delta}_r \frac{\partial P^2}{\partial r} + \vec{\delta}_\theta \left(\frac{1}{r} \frac{\partial P^2}{\partial \theta}\right) + \vec{\delta}_z \frac{\partial P^2}{\partial z} \tag{A-43a}$$

$$\vec{q} = \vec{\delta}_r\, q_r + \vec{\delta}_\theta\, q_\theta + \vec{\delta}_z q_z \tag{A-43b}$$

If flow is plane radial, the above expressions reduce to:

$$\nabla P^2 = \vec{\delta}_r \frac{\partial P^2}{\partial r} \tag{A-44a}$$

$$\vec{q} = \vec{\delta}_r\, q_r \tag{A-44b}$$

Since the directions of the x-axis and the r-axis correspond for the two flow systems, $\vec{i}$ and $\vec{\delta}_r$ are identical vectors. Therefore, for plane radial flow it is possible to replace (x) by (r) everywhere in Equation (A-39). The resulting equation that describes such flow is

$$-\frac{\partial P^2}{\partial r} = \frac{2}{c_o} \left[\frac{\mu}{k_a} (\rho q_r) + F_b (\rho q_r) |\rho q_r|\right] \tag{A-45}$$

III. Derivation of the Macroscopic Equation of Continuity

The derivation of the continuity equation is included for the sake of completeness and can be accomplished by choosing a macroscopic volume element, ΔV, and defining a flow vector, $\overrightarrow{\rho q}$, as:

$$(\overrightarrow{\rho q}) = \frac{\text{macroscopic mass flow rate}}{\text{total cross-sectional area}} \tag{A-46}$$

Summing the flux normal to the surface, over the entire surface of this macroscopic element, the following equation results[44]:

$$\sum (\text{Flux})_{\substack{\text{Normal to} \\ \text{Surface}}} = \iint_{\Delta S} (\overrightarrow{\rho q}) \cdot \vec{n} \; dS \tag{A-47}$$

where ΔS is the total surface area.

By virtue of the Divergence Theorem,

$$\iint_{\Delta S} (\overrightarrow{\rho q}) \cdot \vec{n} \; dS = \iiint_{\Delta V} \nabla \cdot (\overrightarrow{\rho q}) \; dV \tag{A-48}$$

Consequently the flux leaving the element is equal to the negative rate of change of mass within the element, since the flux is actually a mass flow rate. Therefore:

$$\iiint_{\Delta V} \Delta \cdot (\overrightarrow{\rho q}) \; dV = - \frac{\partial m}{\partial t} \tag{A-49}$$

Since $(\Delta V)_{fluid} = \phi(\Delta V)_{total}$, Equation (A-49) can be rewritten as

$$\iiint_{\Delta V_f/\phi} \nabla \cdot (\overrightarrow{\rho q})\, dV = - \frac{\partial m}{\partial t} \tag{A-50}$$

$$\nabla \cdot (\overrightarrow{\rho q}) \left(\frac{\Delta V_f}{\phi}\right) = - \frac{\partial m}{\partial t} \tag{A-51}$$

ΔV_f is independent of time and may be taken into the derivative, viz.:

$$\nabla \cdot (\overrightarrow{\rho q}) = -\phi \frac{\partial}{\partial t} \left(\frac{m}{\Delta V_f}\right)$$

or

$$\nabla \cdot (\overrightarrow{\rho q}) = -\phi \frac{\partial \rho}{\partial t} \tag{A-52}$$

which is the general equation of continuity in terms of macroscopic variables.

For linear flow in the horizontal x-direction, Equation (A-52) becomes

$$\frac{\partial (\rho q_x)}{\partial x} = -\phi \frac{\partial \rho}{\partial t} \tag{A-53}$$

and for plane radial flow Equation (A-52) reduces to

$$\frac{1}{r} \frac{\partial}{\partial r} \left[r \; (\rho q_r) \right] = -\phi \frac{\partial \rho}{\partial r} \tag{A-54}$$

A P P E N D I X   B

DEVELOPMENT OF THE PARTIAL DIFFERENTIAL EQUATIONS WHICH ACCOUNT FOR INERTIAL AND MOLECULAR STREAMING EFFECTS

I. <u>Linear System</u>

The following equations describe transient isothermal flow of gases through a horizontal linear porous system:

1. Quadratic flow equation:

$$-\frac{\partial P}{\partial x} = \frac{\mu}{k_a} q_x + F_b \rho q_x |q_x| \qquad \text{(B-1)}$$

2. Continuity equation:

$$\frac{\partial}{\partial x} (\rho q_x) = - \phi \frac{\partial \rho}{\partial t} \qquad \text{(B-2)}$$

3. Slippage correction term:

$$k_a = k (1 + \frac{b}{P}) \qquad \text{(B-3)}$$

4. Equation of state:

$$\rho = (\frac{M}{z_{ave.} RT}) P \qquad \text{(B-4)}$$

$$= c_o P$$

The viscosity of the gas is considered constant and, although the gas compressibility factor need not have a value of unity (i.e. ideal gases), it is assumed to be constant at some average value for the entire flow duration.

If Equation (B-1) is multiplied by density and combined with Equation (B-4), a more workable Forchheimer equation results:

$$-\frac{\partial p^2}{\partial x} = \frac{2}{c_o} \left[\frac{\mu}{k_a} (\rho q_x) + F_b (\rho q_x) |\rho q_x|\right] \quad \text{(B-5)}$$

If Equations (B-3) and (B-5) are combined, the result is a quadratic flow equation corrected for molecular streaming:

$$-\frac{\partial p^2}{\partial x} = \frac{2}{c_o} \left[\frac{\mu}{k} \left(\frac{P}{P+b}\right)(\rho q_x) + F_b (\rho q_x) |\rho q_x|\right] \quad \text{(B-6)}$$

In order to extend the range of applicability, Equations (B-6) and (B-2) may be rewritten in terms of dimensionless parameters. These equations may be written as:

$$-\frac{\partial \bar{P}^2}{\partial \bar{x}} = \frac{2\,\bar{P}\,(\overline{\rho q_x})}{(\bar{P}+\bar{b})} + 4\,\bar{B}\,(\overline{\rho q_x})\,|\overline{\rho q_x}| \quad \text{(B-7)}$$

$$\frac{\partial (\overline{\rho q_x})}{\partial \bar{x}} = -\frac{1}{2\bar{P}} \frac{\partial \bar{P}^2}{\partial t_D} \quad \text{(B-8)}$$

where $\bar{x} = x/L$ (B-9.a)

$\bar{P} = P/P_f$ (B-9.b)

$\bar{b} = b/P_f$ (B-9.c)

$$\bar{B} = \frac{k^2\,P_f^2\,c_o}{2\,\mu^2\,L} F_b \quad \text{(B-9.d)}$$

$$(\overline{\rho q_x}) = \frac{\mu L}{k\,P_f^2\,c_o} (\rho q_x) \quad \text{(B-9.e)}$$

$$t_D = \frac{k\,P_f}{\phi\,\mu\,L^2} t \quad \text{(B-9.f)}$$

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If common field units are employed, the relationships between dimensionless variables and real variables become:

$$\overline{B} = (5.790 \times 10^{-13}) \frac{k^2 \, P_f^{\,2} \, c_o}{\mu^2 \, L} F_b \tag{B-10.a}$$

$$\overline{\rho q_x} = (1.365 \times 10^{4}) \frac{\mu \, L}{k \, P_f^{\,2} \, c_o} (\rho q_x) \tag{B-10.b}$$

$$t_D = (7.328 \times 10^{-5}) \frac{k \, P_f}{\phi \, \mu \, L^2} t \tag{B-10.c}$$

where the units in the above equations are:

μ = centipoise

L = feet

k = darcies

P_f = psia

c_o = lb_m/psia ft^3

(ρq_x) = lb_m/sec- ft^2

F_b = $(\text{feet})^{-1}$

t = seconds

ϕ = fractional

In order to combine Equations (B-7) and (B-8), the procedure of Tek, Coates, and Katz[45] was adopted. If Equation (B-7) is differentiated with respect to the variable $\overline{x}$, the following equation results:

$$-\frac{\partial^2 \overline{P}^2}{\partial \overline{x}^2} = 2 \frac{\partial}{\partial \overline{x}} \left[\frac{\overline{P}\ (\overline{\rho q_x})}{(\overline{P}+\overline{b})} \right] + 4\ \overline{B}\ \frac{\partial}{\partial \overline{x}} \left[(\overline{\rho q_x})\ |\overline{\rho q_x}| \right]$$

$$= 2 \left[\frac{\overline{P}}{(\overline{P}+\overline{b})} \frac{\partial (\overline{\rho q_x})}{\partial \overline{x}} + (\overline{\rho q_x}) \frac{\overline{b}}{(\overline{P}+\overline{b})^2} \frac{\partial \overline{P}}{\partial \overline{x}} \right]$$

$$+ \left[8\ \overline{B}\ |\overline{\rho q_x}| \frac{\partial (\overline{\rho q_x})}{\partial \overline{x}} \right] \tag{B-11}$$

which may be rearranged as:

$$\frac{\partial (\overline{\rho q_x})}{\partial \overline{x}} = \frac{-(\overline{P}+\overline{b})}{2\ \overline{P}+8\ \overline{B}\ (\overline{P}+\overline{b})\,|\overline{\rho q_x}|} \frac{\partial^2 \overline{P}^2}{\partial \overline{x}^2}$$

$$- \frac{2\ \overline{b}\ (\overline{\rho q_x})}{(\overline{P}+\overline{b}) \left[2\ \overline{P}+8\ \overline{B}\ (\overline{P}+\overline{b})\ |\overline{\rho q_x}| \right]} \frac{\partial \overline{P}}{\partial \overline{x}} \tag{B-12}$$

Substituting the above expression for $\frac{\partial (\overline{\rho q_x})}{\partial \overline{x}}$ in Equation (B-8), a second-order nonlinear partial differential equation results:

$$\left[\frac{(\overline{P}+\overline{b})}{2\ \overline{P}+8\ \overline{B}\ (\overline{P}+\overline{b})\,|\overline{\rho q_x}|} \right] \frac{\partial^2 \overline{P}^2}{\partial \overline{x}^2} + \left[\frac{2\ \overline{b}\ (\overline{\rho q_x})}{(\overline{P}+\overline{b}) \left[2\ \overline{P}+8\ \overline{B}\ (\overline{P}+\overline{b})\,|\rho q_x| \right]} \right]$$

$$\frac{1}{2\overline{P}} \frac{\partial \overline{P}^2}{\partial \overline{x}} = \frac{1}{2\overline{P}} \frac{\partial \overline{P}^2}{\partial t_D} \tag{B-13}$$

Equation (B-13) can be rewritten more concisely as:

$$C(u,u_{\bar{x}})\ u_{\bar{x}\bar{x}} + D(u,u_{\bar{x}})\ u_{\bar{x}} = u_{t_D} \qquad \text{(B-14)}$$

where $u = \bar{p}^2$

$$C(u,u_{\bar{x}}) = \left[\frac{\bar{p}\ (\bar{p}+\bar{b})}{\bar{p}+4\ \bar{B}\ (\bar{p}+\bar{b})\ \overline{\rho q_x}}\right]$$

$$D(u,u_{\bar{x}}) = \left[\frac{\bar{b}\ (\overline{\rho q_x})}{(\bar{p}+\bar{b})(\bar{p}+4\ \bar{B}\ (\bar{p}+\bar{b})|\overline{\rho q_x}|)}\right]$$

Since the nonlinear terms, $C(u,u_{\bar{x}})$ and $D(u,u_{\bar{x}})$, contain the dimensionless mass flow rate per unit area, Equation (B-14) must be solved in conjunction with Equation (B-7) in order to relate $(\overline{\rho q_x})$ to the dimensionless pressure gradient.

II. <u>Radial System</u>

The equations describing transient gas flow through a plane radial porous system are:

1. Quadratic flow equation:

$$\frac{-\partial P}{\partial r} = \frac{\mu}{k_a} q_r + F_b\ \rho q_r\ |q_r| \qquad \text{(B-15)}$$

2. Equation of continuity:

$$\frac{1}{r}\ \frac{\partial}{\partial r}\left[r(\rho q_r)\right] = -\ \phi\ \frac{\partial \rho}{\partial t} \qquad \text{(B-16)}$$

3. Slippage correction term:

$$k_a = k\ (1 + \frac{b}{P}) \tag{B-17}$$

4. Equation of state:

$$\rho = \frac{M}{z_{ave.} RT} P \tag{B-18}$$

$$= c_o P$$

Multiplying Equation (B-15) through by density and eliminating density from the left hand side, the desired form of the Forchheimer equation is obtained, namely:

$$\frac{-\partial P^2}{\partial r} = \frac{2}{c_o} \left[\frac{\mu}{k_a} (\rho q_r) + F_b (\rho q_r) |\rho q_r| \right] \tag{B-19}$$

Using the slippage correction term to correct apparent permeability for molecular streaming, results in the following expression:

$$\frac{-\partial P^2}{\partial r} = \frac{2}{c_o} \left[\frac{\mu}{k} \left(\frac{P}{P+b} \right) (\rho q_r) + F_b (\rho q_r) |\rho q_r| \right] \tag{B-20}$$

Equations (B-16) and (B-20) may be rewritten in terms of dimensionless variables as:

$$\frac{-\partial \overline{P}^2}{\partial \overline{r}} = 2 \left(\frac{\overline{P}}{\overline{P}+\overline{b}} \right) (\overline{\rho q_r}) + 4\ \overline{B}\ (\overline{\rho q_r}) |\overline{\rho q_r}| \tag{B-21}$$

and

$$\frac{1}{\overline{r}} \frac{\partial}{\partial \overline{r}} \left[\overline{r} \, (\overline{\rho q_r}) \right] = - \frac{1}{2\overline{P}} \frac{\partial \overline{P}^2}{\partial t_D} \tag{B-22}$$

where $\overline{r} = r/r_w$ (B-23.a)

$$\overline{P} = P/P_f \tag{B-23.b}$$

$$\overline{b} = b/P_f \tag{B-23.c}$$

$$\overline{B} = \left(\frac{k^2 \; P_f^{\,2} \; c_o}{2 \; \mu^2 \; r_w}\right) F_b \tag{B-23.d}$$

$$(\overline{\rho q_r}) = \left(\frac{\mu \; r_w}{k \; P_f^{\,2} \; c_o}\right) (\rho q_r) \tag{B-23.e}$$

$$t_D = \left(\frac{k \; P_f}{\phi \; \mu \; r_w^{\,2}}\right) t \tag{B-23.f}$$

If the same common field units are employed in the radial system as in the linear system, including the well-bore radius expressed in feet, the constants relating these dimensionless variables to the real variables will also be the same as those in Equations (B-10.a), (B-10.b), and (B-10.c).

The same procedure that was employed for the linear system may be used to combine Equations (B-21) and (B-22). Differentiating Equation (B-21) with respect to the dimensionless radius yields:

$$\frac{-\partial^2 \overline{P}^2}{\partial \overline{r}^2} = 2 \frac{\partial}{\partial \overline{r}} \left[\left(\frac{\overline{P}}{\overline{P}+\overline{b}} \right) (\overline{\rho q_r}) \right] + 4 \, \overline{B} \frac{\partial}{\partial \overline{r}} \left[(\overline{\rho q_r}) \, |\overline{\rho q_r}| \right] \tag{B-24}$$

Or,

$$-\frac{\partial^2 \overline{P}^2}{\partial \overline{r}^2} = 2\left[\left(\frac{\overline{P}}{\overline{P}+\overline{b}}\right)\frac{\partial(\overline{\rho q_r})}{\partial \overline{r}} + \frac{(\overline{\rho q_r})\overline{b}}{(\overline{P}+\overline{b})^2}\frac{\partial \overline{P}}{\partial \overline{r}}\right]$$

$$+ 8\ \overline{B}\ (\overline{\rho q_r})\ \frac{\partial(\overline{\rho q_r})}{\partial \overline{r}} \qquad \text{(B-25)}$$

Rearranging Equation (B-25) yields:

$$\frac{\partial(\overline{\rho q_r})}{\partial \overline{r}} = \frac{-(\overline{P}+\overline{b})}{2\ \overline{P}+8\ \overline{B}\ (\overline{P}+\overline{b})\,|\overline{\partial q_r}|}\ \frac{\partial^2 \overline{P}^2}{\partial \overline{r}^2}$$

$$\frac{-\ 2\ \overline{b}\ (\overline{\rho q_r})}{(\overline{P}+\overline{b})\ \left[2\ \overline{P}+8\ \overline{B}\ (\overline{P}+\overline{b})\ |\overline{\rho q_r}|\right]}\ \frac{\partial \overline{P}}{\partial \overline{r}} \qquad \text{(B-26)}$$

Equation (B-22) may be expanded to yield:

$$\frac{\partial(\overline{\rho q_r})}{\partial \overline{r}} + \frac{(\overline{\rho q_r})}{\overline{r}} = -\ \frac{1}{2\overline{P}}\ \frac{\partial \overline{P}^2}{\partial t_D} \qquad \text{(B-27)}$$

Substituting the expression for $\frac{\partial(\overline{\rho q_r})}{\partial \overline{r}}$ from Equation (B-26) into Equation (B-27) results in the following equation:

$$\left[\frac{\overline{P}+\overline{b}}{2\ \overline{P}+8\ \overline{B}\ (P+b)\,|\overline{\rho q_r}|}\right]\frac{\partial^2 \overline{P}^2}{\partial \overline{r}^2} + \left[\frac{2\ \overline{b}\ (\overline{\rho q_r})}{(\overline{P}+\overline{b})\ \left[2\overline{P}+8\ \overline{B}\ (\overline{P}+\overline{b})\,|\overline{\rho q_r}|\right]}\right]$$

$$\frac{1}{2\overline{P}}\ \frac{\partial \overline{P}^2}{\partial \overline{r}} - \frac{(\overline{\rho q_r})}{\overline{r}} = \frac{1}{2\overline{P}}\ \frac{\partial \overline{P}^2}{\partial t_D} \qquad \text{(B-28)}$$

Equation (B-28) can be rewritten as:

$$\left[\frac{\overline{P}(\overline{P}+b)}{\overline{P}+4\ \overline{B}\ (\overline{P}+\overline{b})\,|\overline{\rho q_r}|}\right]\frac{\partial^2\overline{P}^2}{\partial\overline{r}^2} + \left[\frac{\overline{b}(\overline{\rho q_r})}{(\overline{P}+\overline{b})\left[\overline{P}+4\ \overline{B}\ (\overline{P}+\overline{b})\,|\overline{\rho q_r}|\right]}\right]\frac{\partial\overline{P}^2}{\partial\overline{r}}$$

$$\frac{-\ 2\ \overline{P}\ (\overline{\rho q_r})}{\overline{r}} = \frac{\partial\overline{P}^2}{\partial t_D} \qquad \text{(B-29)}$$

In order to permit closely spaced increments near the wellbore and still retain equal increments in the space variable, the space variable may be redefined as, $\xi = \ln \overline{r}$. Therefore:

1. $$\frac{\partial^2\overline{P}^2}{\partial\overline{r}^2} = e^{-2\xi}\left[\frac{\partial^2\overline{P}^2}{\partial\xi^2} - \frac{\partial\overline{P}^2}{\partial\xi}\right] \qquad \text{(B-30.a)}$$

2. $$\frac{\partial\overline{P}^2}{\partial\overline{r}} = e^{-\xi}\ \frac{\partial\overline{P}^2}{\partial\xi} \qquad \text{(B-30.b)}$$

3. $$\frac{-2\ \overline{P}\ (\overline{\rho q_r})}{\overline{r}} = \frac{-2\ \overline{P}\ (\overline{\rho q_\xi})}{e^{\xi}} \qquad \text{(B.30.c)}$$

in which case Equation (B-29) may be written as:

$$C(u,u_\xi)u_{\xi\xi} + D(u,u_\xi)u_\xi + E(u,u_\xi) = u_{t_D} \qquad \text{(B-31)}$$

where $u = \overline{P}^2$

$$C(u,u_\xi) = \frac{\overline{P}(\overline{P}+\overline{b})e^{-2\xi}}{\overline{P}+4\ \overline{B}\ (\overline{P}+\overline{b})(\overline{\rho q_\xi})}$$

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$$D(u,u_\xi) = \frac{\overline{b}\ (\overline{\rho q_\xi})\ e^{-\xi} - \overline{P}\ (\overline{P}+\overline{b})^2\ e^{-2\xi}}{(\overline{P}+\overline{b})\ \left[\overline{P}+4\ \overline{B}\ (\overline{P}+\overline{b})\ |\overline{\rho q_\xi}|\right]}$$

$$E(u,u_\xi) = -\ 2\ \overline{P}\ e^{-\xi}\ (\overline{\rho q_\xi})$$

Since the nonlinear terms $C(u,u_\xi)$, $D(u,u_\xi)$, and $E(u,u_\xi)$ contain the flow rate, $(\overline{\rho q_\xi})$, the solution to Equation (B-31) must be coupled with the dimensionless Forchheimer equation which accounts for molecular streaming. This equation, in terms of the new independent space variable, may be written as:

$$\frac{-\partial \overline{P}^2}{\partial \xi} = \frac{2\ \overline{P}\ e^{\xi}}{(\overline{P}+\overline{b})}\ (\overline{\rho q_\xi}) + 4\ \overline{B}\ e^{\xi}\ (\overline{\rho q_\xi})\ |\overline{\rho q_\xi}| \qquad \text{(B-32)}$$

<u>NOTE</u>:

Subsequent to the completion of this work it was realized that the numerical integration of the describing partial differential equation would be more stable if Equation (B-22) were not expanded. Equations (B-21) and (B-22) should instead be combined into the following general form:

$$g(u)\ \frac{\partial}{\partial \overline{r}} \left[k(u)\ \frac{\partial u}{\partial \overline{r}}\right] = \frac{\partial u}{\partial t_D} \qquad \text{(B-33)}$$

where g(u) and k(u) represent general functions of u.

By employing a finite difference approximation on the space variable, a system of nonlinear algebraic equations would result, namely:

$$(\vec{u})_{m+1} = [T] \cdot (\vec{u})_m \qquad \text{(B-34)}$$

The properties of the matrix $[T]$ are such that the integrating scheme for the above system of equations is more stable than the integrating scheme resulting from the discretization of Equation (B-29). In fact if an equation similar to Equation (B-33) but in the linear system is discretized, the spectral radius of the matrix $[T]$ will be less than unity regardless of the value of $\left(\frac{\Delta t_D}{\Delta \bar{r}} \right)$. This property guarantees stable integration.

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DEVELOPMENT OF THE MATERIAL BALANCE

A material balance was performed by integrating the net production from each system with respect to the total elapsed time and comparing the dimensionless mean pressure thus obtained, $(\overline{P}_M)_1$, with the one obtained by computing an integrated average of the pressure distribution, $(\overline{P}_M)_2$, at a corresponding time. The difference between these two mean pressures was the criterion used to calculate the material balance percent error.

I. Calculating $(\overline{P}_M)_1$

If it is assumed that the modified gas flow is valid, then:

$$PV = z \left(\frac{W}{M} \right) RT \tag{C-1}$$

Taking a ratio of Equation (C-1) at an initial time (i) and any subsequent time (t) yields:

$$\frac{(PV)_i}{(PV)_t} = \frac{(z\ WT/M)_i}{(z\ WT/M)_t} \tag{C-2}$$

But $V_i = V_t$ (pore volume remains constant)

$z_i = z_t$ (compressibility factor is assumed to be a constant)

$T_i = T_t$ (isothermal flow)

$P_i = P_f$

Therefore, Equation (C-2) reduces to the following expression:

$$P_t = P_f \left(\frac{W_t}{W_i} \right) \tag{C-3}$$

Or,

$$P_t = (P_M)_1 = P_f \left[1 - \frac{(W_p)_{net}}{W_i}\right]$$

a. Linear system

The initial gas in place may be calculated in the following way:

$$(PV)_i = \left[z \left(\frac{W}{M}\right) RT\right]_i$$

Therefore, $$W_i = c_o V_i P_f \qquad (C-4)$$

$$= c_o (A \phi L) P_f$$

The mass of gas produced can be calculated:

$$[W_p]_{net} = \int_{t_i}^{t} A (\rho q_x)_{net}\, dt \qquad (C-5)$$

$$[W_p]_{net} = (A\phi L)\, c_o\, P_f \int_{t_{Di}}^{t_D} (\overline{\rho q_x})_{net}\, dt_D \qquad (C-6)$$

This can be written as:

$$[W_p]_{net} = (A\phi L)\, c_o\, P_f \left[\int_{t_{D_i}}^{t_D} (\overline{\rho q_x})\, dt_D{}_{\ell=1} - \int_{t_{D_i}}^{t_D} (\overline{\rho q_x})\, dt_D{}_{\ell=LL}\right]$$

(C-7)

Substituting Equations (C-4) and (C-7) into Equation (C-3), results in the following expression:

$$(P_M)_1 = P_f \left[1 - \int_{t_{D_i}}^{t_D} (\overline{\rho q_x})\, dt_D{}_{\ell=1} + \int_{t_{D_i}}^{t_D} (\overline{\rho q_x})\, dt_D{}_{\ell=LL}\right] \qquad (C-8)$$

or

$$(\bar{P}_M)_1 = 1 - \int_{t_{D_i}}^{t_D} (\overline{\rho q_x})\,dt_D{}_{\ell=1} + \int_{t_{D_i}}^{t_D} (\overline{\rho q_x})\,dt_D{}_{\ell=LL} \qquad \text{(C-9)}$$

that is,

$$(P_M)_1 = 1 - \bar{W}_p \qquad \text{(C-10)}$$

b. Radial system

The initial gas in place is:

$$W_i = c_o\, V_i\, P_f \qquad \text{(C-11)}$$

$$= c_o\, \pi\, h\, \phi\, (r_e^2 - r_w^2)\, P_f$$

The mass of gas produced can be calculated in the following way:

$$(W_p)_{net} = \int_{t_i}^{t} A\,(\rho q_r)_{net}\,dt \qquad \text{(C-12)}$$

$$= \int_{t_i}^{t} \left[A(\rho q_r)\right] dt_{\ell=1} - \int_{t_i}^{t} \left[A(\rho q_r)\right] dt_{\ell=LL}$$

Or,

$$(W_p)_{net} = 2\,\pi\, h\, c_o\, P_f\, \phi\, r_w \left[r_w \int_{t_{D_i}}^{t_D} (\overline{\rho q_r})\,dt_D{}_{\ell=1} - r_e \int_{t_{D_i}}^{t_D} (\overline{\rho q_r})\,dt_D{}_{\ell=LL} \right]$$

(C-13)

By substituting Equations (C-11) and (C-13) into Equation (C-3) the following expression results:

$$(\overline{P}_M)_1 = 1.0 - \frac{2\int_{t_{D_i}}^{t_D} (\overline{\rho q_r}) dt_D \Big|_{\ell=1} + 2\left(\frac{r_e}{r_w}\right)\int_{t_{D_i}}^{t_D} (\overline{\rho q_r}) dt_D \Big|_{\ell=LL}}{\left[\left(\frac{r_e}{r_w}\right)^2 - 1.0\right]} \tag{C-14}$$

Equations (C-9) and (C-14) are exact expressions for the mean pressure that would be obtained in the respective porous systems, if the amount of gas produced was used as a criterion for the calculation.

The definite integrals in these two equations were evaluated by calculating a two-point average value of the dimensionless flow rate for a time increment, and multiplying this value by the magnitude of the increment. This yielded the total mass flow rate out of the reservoir during the time increment in question. These flow rates were then summed to give a total net production out of the reservoir up to some specified time, yielding $(\overline{P}_M)_1$ according to Equation (C-10).

II. Calculating $(P_M)_2$

a. Linear system

An exact expression for the mean pressure of a linear system, as calculated from the pressure profile, is the following:

$$(\overline{P}_M)_2 = \frac{\int_0^{1.0} \overline{P}\, d\overline{x}}{\int_0^{1.0} dx} = \int_0^{1.0} \overline{P}\, d\overline{x} \qquad \text{(C-15)}$$

Equation (C-15), which was integrated using Simpson's Rule, could be approximated by the following discrete expression:

$$(\overline{P}_M) \simeq \frac{\Delta\overline{x}}{3} \Big[\overline{P}_{\ell=1} + 4\,\overline{P}_{\ell=2} + 2\,\overline{P}_{\ell=3} + \cdots$$

$$+ 2\,\overline{P}_{\ell=LL-2} + 4\,\overline{P}_{\ell=LL-1} + \overline{P}_{\ell=LL} \Big] \qquad \text{(C-16)}$$

b. <u>Radial system</u>

Similarly, it can be written that

$$(\overline{P}_M)_2 = \frac{\int^{A} \overline{P} dA}{\int^{A} dA} \qquad \text{(C-17)}$$

Or,

$$(\overline{P}_M)_2 = \frac{\int_{r_w}^{r_e} \overline{P} r dr}{\int_{r_w}^{r_e} r dr} = \frac{2}{r_w^2 \left[\overline{r}_e^{\,2} - 1\right]} \int_{r_w}^{r_e} \overline{P}\; r\; dr \qquad \text{(C-18)}$$

The definite integral in Equation (C-18) was approximated by means of the following discrete equation:

$$\int_{r_w}^{r_e} \bar{P}\, r dr = \left(\frac{\bar{P}_2+\bar{P}_w}{2}\right)\left(\frac{r_2^{\,2}-r_w^{\,2}}{2}\right)+\left(\frac{\bar{P}_3+\bar{P}_2}{2}\right)\left(\frac{r_3^{\,2}-r_2^{\,2}}{2}\right) + \cdots$$

$$+ \left(\frac{\bar{P}_e+\bar{P}_{LL-1}}{2}\right)\left(\frac{r_e^{\,2}-r_{LL-1}^{\,2}}{2}\right) \qquad \text{(C-19)}$$

Substituting Equation (C-19) into Equation (C-18) results in:

$$(\bar{P}_M)_2 = \frac{1}{(\bar{r}_e^{\,2} - 1)}\left[\frac{(\bar{P}_2+\bar{P}_w)(\bar{r}_2-\bar{r}_w^{\,2})}{2} + \frac{(\bar{P}_3+\bar{P}_2)(\bar{r}_3^{\,2}-\bar{r}_2^{\,2})}{2} + \cdots + \frac{(\bar{P}_e+\bar{P}_{LL-1})(\bar{r}_e^{\,2}-\bar{r}_{LL-1}^{\,2})}{2}\right] \qquad \text{(C-20)}$$

The percent error in the material balance could then be computed for either the linear or the radial system according to the following expression:

$$\%\ \text{ERROR} = 100 \left| \frac{(\bar{P}_M)_2 - (\bar{P}_M)_1}{(\bar{P}_M)_2} \right| \qquad \text{(C-21)}$$

A P P E N D I X   D

DISCRETIZATION OF THE PARTIAL DIFFERENTIAL EQUATIONS FOR THE LINEAR SYSTEM

The nonlinear partial differential equation describing linear, horizontal, isothermal gas flow through porous media is restated below:

$$C(u,u_{\overline{x}})\, u_{\overline{xx}} + D(u,u_{\overline{x}})\, u_{\overline{x}} = u_{t_D} \tag{D-1}$$

Employing second order correct central-difference approximations of the space derivatives, the following discrete approximations are obtained:

$$(u_{\overline{xx}})_{\ell} \simeq \frac{u_{\ell+1} - 2\,u_{\ell} + u_{\ell-1}}{(\Delta\overline{x})^2} \tag{D-2}$$

$$(u_{\overline{x}})_{\ell} \simeq \frac{u_{\ell+1} - u_{\ell-1}}{2(\Delta\overline{x})} \tag{D-3}$$

These give rise to an ordinary differential equation, represented by Equation (D-4), which approximates the partial differential equation:

$$C(u,u_{\overline{x}})_{\ell} \left[\frac{u_{\ell+1} - 2\,u_{\ell} + u_{\ell-1}}{(\Delta\overline{x})^2}\right] + D(u,u_{\overline{x}})_{\ell} \left[\frac{u_{\ell+1} - u_{\ell-1}}{2(\Delta\overline{x})}\right]$$

$$= \left(\frac{du}{dt_D}\right)_{\ell} \tag{D-4}$$

The Crank-Nicholson Implicit procedure uses a forward difference approximation on the time derivative, namely:

$$\left(\frac{du}{dt_D}\right)_{\ell,m+\frac{1}{2}} \simeq \left(\frac{u_{m+1} - u_m}{\Delta t_D}\right)_{\ell}$$

and space derivatives evaluated at a corresponding time level of $(m+\frac{1}{2})$. Equation (D-4) is therefore rewritten as:

$$C(u,u_{\bar{x}})_{\ell,m+\frac{1}{2}}\left[\frac{u_{\ell+1}-2u_{\ell}+u_{\ell-1}}{(\Delta\bar{x})^2}\right]_{m+\frac{1}{2}} + D(u,u_{\bar{x}})_{\ell,m+\frac{1}{2}}$$

$$\left[\frac{u_{\ell+1}-u_{\ell-1}}{2(\Delta\bar{x})}\right] = \left[\frac{u_{m+1}-u_{m}}{\Delta t_D}\right]_{\ell} \qquad \text{(D-5)}$$

Or:

$$\frac{C_{\ell,m+\frac{1}{2}}}{2}\left[\frac{u_{\ell+1,m+1}-2u_{\ell,m+1}+u_{\ell-1,m+1}}{(\Delta\bar{x})^2} + \frac{u_{\ell+1,m}-2u_{\ell,m}+u_{\ell-1,m}}{(\Delta\bar{x})^2}\right] +$$

$$\frac{D_{\ell,m+\frac{1}{2}}}{2}\left[\frac{u_{\ell+1}-u_{\ell-1}}{2(\Delta\bar{x})} + \frac{u_{\ell+1}-u_{\ell-1}}{2(\Delta\bar{x})}\right] = \left[\frac{u_{\ell,m+1}-u_{\ell,m}}{\Delta t_D}\right] \qquad \text{(D-6)}$$

where $C_{\ell,m+\frac{1}{2}} = \frac{1}{2}\left[C_{\ell,m+1} + C_{\ell,m}\right]$

$D_{\ell,m+\frac{1}{2}} = \frac{1}{2}\left[D_{\ell,m+1} + D_{\ell,m}\right]$

Equation (D-6) can be rearranged to yield:

$$-\left[\frac{C_{\ell,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} - \frac{D_{\ell,m+\frac{1}{2}}}{4(\Delta\bar{x})}\right]u_{\ell-1,m+1} + \left[\frac{1}{\Delta t_D} + \frac{C_{\ell,m+\frac{1}{2}}}{(\Delta\bar{x})^2}\right]u_{\ell,m+1}$$

$$-\left[\frac{C_{\ell,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} + \frac{D_{\ell,m+\frac{1}{2}}}{4(\Delta\bar{x})}\right]u_{\ell+1,m+1} = \frac{C_{\ell,m+\frac{1}{2}}}{2(\Delta\bar{x})^2}\left[u_{\ell+1,m}-2u_{\ell,m}+u_{\ell-1,m}\right]$$

$$+ \frac{D_{\ell,m+\frac{1}{2}}}{4(\Delta\bar{x})} \left[u_{\ell+1,m} - u_{\ell-1,m} \right] + \frac{u_{\ell,m}}{\Delta t_D} \tag{D-7}$$

This is a general equation for any grid point (ℓ). Since an equation of this form must be written for every grid point where $(u)_{m+1}$ is unknown, a system of equations results, which can be concisely represented by:

$$\boxed{M}_{m+\frac{1}{2}} \cdot (\vec{u})_{m+1} = (\vec{a})_m \tag{D-8}$$

The size of this system of nonlinear algebraic equations depends upon the number of grid points at which $(u)_{m+1}$ must be evaluated. As a result the system size depends on the set of boundary conditions being considered. Two more unknowns are introduced than there are equations. These are subsequently removed by use of the two available boundary conditions. In order to maintain a consistent truncation error, the Neumann boundary conditions were approximated by finite difference formulas having the same truncation error as the formulas used to discretize the differential equation itself (i.e. second-order).

Each set of boundary conditions yielded a different sized matrix with different nonlinear terms. Therefore, the boundary conditions are treated separately.

CASE I

1. At the producing face ($\ell = 1$)

$$(\overline{\rho q_x})_{1,m+1} = \bar{c}_w \quad (0<m\leq MM) \tag{D-9}$$

This flow rate is related to the pressure distribution through Forchheimer's equation corrected for slippage, namely:

$$-(u_{\bar{x}})_{1,m+1} = \left[\frac{2\ \bar{P}}{(\bar{P}+\bar{b})}\ (\overline{\rho q_x}) + 4\ \bar{B}\ (\overline{\rho q_x})\,|\overline{\rho q_x}|\right] \tag{D-10}$$

Or

$$\frac{u_{0,m+1}-u_{2,m+1}}{2(\Delta\bar{x})} = \frac{2\ \bar{P}_{1,m+1}\ \bar{c}_w}{(\bar{P}_{1,m+1}+\bar{b})} + 4\ \bar{B}\ (\bar{c}_w)\,|\bar{c}_w|\ . \tag{D-11}$$

from which:

$$u_{0,m+1} = 2(\Delta\bar{x})\left[\frac{2\bar{c}_w\bar{P}_{1,m+1}}{(\bar{P}_{1,m+1}+\bar{b})} + 4\ \bar{B}\ (\bar{c}_w)\ |\bar{c}_w|\right] + u_{2,m+1} \tag{D-12}$$

Similarly, at time level m:

$$u_{0,m} = 2\ (\Delta\bar{x})\left[\frac{2\bar{c}_w\bar{P}_{1,m}}{(\bar{P}_{1,m}+\bar{b})} + 4\ \bar{B}\ \bar{c}_w\ |\bar{c}_w|\right] + u_{2,m} \tag{D-13}$$

Equation (D-7) written for the grid point $\ell = 1$ yields the following:

$$-\left[\frac{C_{1,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} - \frac{D_{1,m+\frac{1}{2}}}{4(\Delta\bar{x})}\right] u_{0,m+1} + \left[\frac{1}{\Delta t_D} + \frac{C_{1,m+\frac{1}{2}}}{(\Delta\bar{x})^2}\right] u_{1,m+1}$$

$$- \left[\frac{C_{1,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} + \frac{D_{1,m+\frac{1}{2}}}{4(\Delta\bar{x})}\right] u_{2,m+1} = \frac{C_{1,m+\frac{1}{2}}}{2(\Delta\bar{x})^2}\left[u_{2,m}-2u_{1,m}+u_{0,m}\right]$$

$$+ \frac{D_{1,m+\frac{1}{2}}}{4(\Delta\bar{x})}\left[u_{2,m}-u_{0,m}\right] + \frac{u_{1,m}}{\Delta t_D} \qquad \text{(D-14)}$$

If Equation (D-12) is used, Equation (D-14) may be rewritten as:

$$M(1,1)\, u_{1,m+1} + M(1,2)\, u_{2,m+1} = a\ (1) \qquad \text{(D-15)}$$

where $M(1,1) = \left[\frac{1}{\Delta t_D} + \frac{C_{1,m+\frac{1}{2}}}{(\Delta\bar{x})^2}\right]$

$$M(1,2) = - \left[\frac{C_{1,m+\frac{1}{2}}}{(\Delta\bar{x})^2}\right]$$

$$a(1) = \frac{C_{1,m+\frac{1}{2}}}{2(\Delta\bar{x})^2}\left[u_{2,m} - 2\,u_{1,m} + u_{0,m}\right]$$

$$+ \frac{D_{1,m+\frac{1}{2}}}{4(\Delta\bar{x})}\left[u_{2,m}-u_{0,m}\right] + 2(\Delta\bar{x})\left[\frac{C_{1,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} - \frac{D_{1,m+\frac{1}{2}}}{4(\Delta\bar{x})}\right] \cdot$$

$$\left[\frac{2\,\bar{P}_{1,m+1}}{\bar{P}_{1,m+1}+b}\,\bar{c}_w + 4\,\bar{B}\,\bar{c}_w\,|\bar{c}_w|\right] + \frac{u_{1,m}}{\Delta t_D}$$

2. <u>At the external boundary (ℓ = LL)</u>

$$\bar{P}_{LL,m+1} = 1.0 \qquad (0 < m \leq MM) \qquad \text{(D-16)}$$

Equation (D-7) for the grid point (LL - 1) may be written as:

$$- \left[\frac{C_{LL-1,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} - \frac{D_{LL-1,m+\frac{1}{2}}}{4(\Delta\bar{x})} \right] u_{LL-2,m+1} + \left[\frac{1}{\Delta t_D} + \frac{C_{LL-1,m+\frac{1}{2}}}{(\Delta\bar{x})^2} \right]$$

$$u_{LL-1,m+1}$$

$$- \left[\frac{C_{LL-1,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} + \frac{D_{LL-1,m+\frac{1}{2}}}{4(\Delta\bar{x})} \right] u_{LL,m+1} = \frac{C_{LL-1,m+\frac{1}{2}}}{2(\Delta\bar{x})^2}$$

$$\left[u_{LL,m} - 2u_{LL-1,m} + u_{LL-2,m} \right]$$

$$+ \frac{D_{LL-1,m+\frac{1}{2}}}{4(\Delta\bar{x})} \left[u_{LL,m} - u_{LL-2} \right] + \frac{u_{LL-1,m}}{\Delta t_D} \qquad \text{(D-17)}$$

This equation can be rewritten in the following manner:

$$M(II,JJ-1)\ u_{LL-2,m+1} + M(II,JJ)\, u_{LL-1,m+1} = a(II) \qquad \text{(D-18)}$$

where $M(II,JJ-1) = - \left[\frac{C_{LL-1,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} - \frac{D_{LL-1,m+\frac{1}{2}}}{4(\Delta\bar{x})} \right]$

$$M(II,JJ) = \left[\frac{1}{\Delta t_D} + \frac{C_{LL-1,m+\frac{1}{2}}}{(\Delta \bar{x})^2} \right]$$

$$a(II) = \left[\frac{C_{LL-1,m+\frac{1}{2}}}{2(\Delta \bar{x})^2} (u_{LL,m} - 2u_{LL-1,m} + u_{LL-2,m}) \right.$$

$$+ \frac{D_{LL-1,m+\frac{1}{2}}}{4(\Delta \bar{x})} (u_{LL,m} - u_{LL-2,m}) + \frac{u_{LL-1,m}}{\Delta t_D} + \left(\frac{C_{LL-1,m+\frac{1}{2}}}{2(\Delta \bar{x})^2} + \right.$$

$$\left. \left. \frac{D_{LL-1,m+\frac{1}{2}}}{4(\Delta \bar{x})} \right) \right]$$

Every other element in the tridiagonal matrix $[M]$ and the vector (a) are computed using the following general equation:

$$M(I,J-1)\, u_{\ell-1,m+1} + M(I,J)\, u_{\ell,m+1} + M(I,J+1)\, u_{\ell+1,m+1}$$

$$= a(I) \qquad \text{(D-19)}$$

where $M(I,J-1) = - \left[\frac{C_{\ell,m+\frac{1}{2}}}{2(\Delta \bar{x})^2} - \frac{D_{\ell,m+\frac{1}{2}}}{4(\Delta \bar{x})} \right]$

$$M(I,J) = \left[\frac{1}{\Delta t_D} + \frac{C_{\ell,m+\frac{1}{2}}}{(\Delta \bar{x})^2} \right]$$

$$M(I,J+1) = - \left[\frac{C_{\ell,m+\frac{1}{2}}}{2(\Delta \bar{x})^2} + \frac{D_{\ell,m+\frac{1}{2}}}{4(\Delta \bar{x})} \right]$$

$$a(I) = \left[\frac{C_{\ell,m+\frac{1}{2}}}{2(\Delta \bar{x})^2} (u_{\ell+1,m} - 2u_{\ell,m} + u_{\ell-1,m}) \right.$$

$$[illegible]$$

$$[illegible]$$

$$[illegible]$$

$$[illegible]$$

[illegible]

$$[illegible]$$

$$[illegible]$$

$$[illegible]$$

$$[illegible]$$

$$[illegible]$$

$$+ \frac{D_{\ell,m+\frac{1}{2}}}{4(\Delta\bar{x})} (u_{\ell+1,m} - u_{\ell-1,m}) + \left.\frac{u_{\ell,m}}{\Delta t_D}\right]$$

The matrix size for Case I will be

$$II = JJ = (LL - 1) \tag{D-20}$$

CASE II

1. At the producing face ($\ell = 1$)

$$(\overline{\rho q_x})_{1,m+1} = \bar{c}_w \quad (0 < m \leq MM) \tag{D-21}$$

Since this boundary condition is identical to the one encountered in Case I, the matrix elements M(1,1) and M(1,2), and the vector element a(1) will be defined by Equation (D-15).

2. At the external boundary ($\ell = LL$)

$$(\overline{\rho q_x})_{LL,m+1} = 0 \quad (0 < m \leq MM) \tag{D-22}$$

This boundary condition may be applied by demanding that

$$u_{LL+1,m+1} = u_{LL-1,m+1} \tag{D-23}$$

and

$$u_{LL+1,m} = u_{LL-1,m} \tag{D-24}$$

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

When Equation (D-7) is written for the grid point ℓ = LL, the following equation is obtained:

$$- \left[\frac{C_{LL,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} - \frac{D_{LL,m+\frac{1}{2}}}{4(\Delta\bar{x})}\right] u_{LL-1,m+1} + \left[\frac{1}{\Delta t_D} + \frac{C_{LL,m+\frac{1}{2}}}{(\Delta\bar{x})^2}\right] u_{LL,m+1}$$

$$- \left[\frac{C_{LL,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} + \frac{D_{LL,m+\frac{1}{2}}}{4(\Delta\bar{x})}\right] u_{LL+1,m+1} = \frac{C_{LL,m+\frac{1}{2}}}{2(\Delta\bar{x})^2}\left[u_{LL+1,m} - 2u_{LL,m} + u_{LL-1,m}\right]$$

$$+ \frac{D_{LL,m+\frac{1}{2}}}{4(\Delta\bar{x})}\left[u_{LL+1,m} - u_{LL-1,m}\right] + \frac{u_{LL,m}}{\Delta t_D} \qquad \text{(D-25)}$$

Making use of the relationship (D-23) and (D-24), Equation (D-25) may be written as:

$$M(II,JJ-1)\, u_{LL-1,m+1} + M(II,JJ)\, u_{LL,m+1} = a(II) \qquad \text{(D-26)}$$

where

$$M(II,JJ-1) = - \left[\frac{C_{LL,m+\frac{1}{2}}}{(\Delta\bar{x})^2}\right]$$

$$M(II,JJ) = \left[\frac{1}{\Delta t_D} + \frac{C_{LL,m+\frac{1}{2}}}{(\Delta\bar{x})^2}\right]$$

$$a(II) = \left[\frac{C_{LL,m+\frac{1}{2}}}{(\Delta\bar{x})^2}\left(u_{LL-1,m} - u_{LL,m}\right) + \frac{u_{LL,m}}{\Delta t_D}\right]$$

At every other grid point, the tridiagonal elements of the matrix and the known vector are defined by Equation (D-19).

The size of the matrix for Case II will be:

$$II = JJ = LL \tag{D-27}$$

CASE III

1. At the producing face ($\ell = 1$)

$$\overline{P}_{1,m+1} = \overline{P}_w \qquad (0 < m \leq MM) \tag{D-28}$$

Writing Equation (D-7) for the grid point $\ell = 2$, the following is obtained:

$$-\left[\frac{C_{2,m+\frac{1}{2}}}{2(\Delta\overline{x})^2} - \frac{D_{2,m+\frac{1}{2}}}{4(\Delta\overline{x})}\right] u_{1,m+1} + \left[\frac{1}{\Delta t_D} + \frac{C_{2,m+\frac{1}{2}}}{(\Delta\overline{x})^2}\right] u_{2,m+1}$$

$$-\left[\frac{C_{2,m+\frac{1}{2}}}{2(\Delta\overline{x})^2} + \frac{D_{2,m+\frac{1}{2}}}{4(\Delta\overline{x})}\right] u_{3,m+1} = \frac{C_{2,m+\frac{1}{2}}}{2(\Delta\overline{x})^2}\left[u_{3,m}-2u_{2,m}+u_{1,m}\right]$$

$$+ \frac{D_{2,m+\frac{1}{2}}}{4(\Delta\overline{x})}\left[u_{3,m}-u_{1,m}\right] + \frac{u_{2,m}}{\Delta t_D} \tag{D-29}$$

If the boundary condition dictated by Equation (D-28) is introduced Equation (D-29) becomes:

$$M(1,1)\ u_{2,m+1} + M(1,2)\ u_{3,m+1} = a(1) \tag{D-30}$$

$$\text{where}\quad M(1,1) = \left[\frac{1}{\Delta t_D} + \frac{C_{2,m+\frac{1}{2}}}{(\Delta\bar{x})^2}\right]$$

$$M(1,2) = -\left[\frac{C_{2,m+\frac{1}{2}}}{2(\Delta\bar{x})^2} + \frac{D_{2,m+\frac{1}{2}}}{4(\Delta\bar{x})}\right]$$

$$a(1) = \frac{C_{2,m+\frac{1}{2}}}{2(\Delta\bar{x})^2}\left[u_{3,m} - 2u_{2,m} + 2\ (\bar{P}_w)^2\right]$$

$$+ \frac{D_{2,m+\frac{1}{2}}}{4(\Delta\bar{x})}\left[u_{3,m} - 2\ (\bar{P}_w)^2\right] + \frac{u_{2,m}}{\Delta t_D}$$

2. <u>At the external boundary (ℓ = LL)</u>

$$(\overline{\rho q_x})_{LL,m+1} = 0 \qquad (0 < m \leq MM) \tag{D-31}$$

This boundary condition is identical to the one in Case III, and the elements M(II,JJ-1), M(II,JJ), and a(II) are governed by Equation (D-26). The remaining elements are defined by Equation (D-19), while the matrix size is:

$$II = JJ = (LL - 1) \tag{D-32}$$

<u>CASE IV</u>

1. <u>At the producing face (ℓ = 1)</u>

$$\bar{P}_{1,m+1} = \bar{P}_w \qquad (0 < m \leq MM) \tag{D-33}$$

The elements M(1,1), M(1,2) and a(1) are defined by Equation (D-30).

2. <u>At the external boundary (ℓ = LL)</u>

$$\overline{P}_{LL,m+1} = 1.0 \qquad (0 < m \leq MM) \qquad \text{(D-34)}$$

Since this boundary condition is identical to the external boundary condition in Case I, the elements M(II,JJ-1), M(II,JJ) and a(II) are governed by Equation (D-18). Equation (D-19) fixes the remaining elements in the matrix equation while the size of the matrix for Case IV is:

$$II = JJ = (LL - 2) \qquad \text{(D-35)}$$

<u>Calculating flow rate in the nonlinear terms</u>

The nonlinear terms $C_{\ell,m+\frac{1}{2}}$ and $D_{\ell,m+\frac{1}{2}}$ contain flow rates, $(\overline{\rho q_x})_{\ell,m+\frac{1}{2}}$, which are related to the dependent variable (u) through the modified Forchheimer equation. The term $(u_{\overline{x}})$ in this equation was approximated by a finite difference approximation with a third-order truncation error. The difference equation was written in terms of values at grid points which were within the physical system. These finite difference equations were obtained by applying the Taylor Series expansion (carried out to include the third-order derivatives) to the following functions:

$u_{\ell\pm1}$; $u_{\ell\pm2}$; $u_{\ell\pm3}$; and $u_{\ell\pm4}$.

The derivatives $(u_{\overline{xx}})$ and $(u_{\overline{xxx}})$ were eliminated by selectively combining the eight expansions, the results being an expression for $(u_{\overline{x}})$.

The following is a summary of the third-order correct finite difference equations used to approximate the $(u_{\overline{x}})$ term in the Forchheimer equation:

a. <u>When $\ell = 1$</u>

$$(u_{\overline{x}})_\ell = \frac{27u_{\ell+4}-64u_{\ell+3}-36u_{\ell+2}+288u_{\ell+1}-215u_\ell}{132(\Delta\overline{x})} \tag{D-36}$$

b. <u>When $\ell = 2, 3, \ldots LL-2$</u>

$$(u_{\overline{x}})_\ell = \frac{-u_{\ell+2}+6u_{\ell+1}-3u_\ell-2u_{\ell-1}}{6(\Delta\overline{x})} \tag{D-37}$$

c. <u>When $\ell = LL-1$</u>

$$(u_{\overline{x}})_\ell = \frac{2u_{\ell+1}+3u_\ell-6u_{\ell-1}+u_{\ell-2}}{6(\Delta\overline{x})} \tag{D-38}$$

d. <u>When $\ell = LL$</u>

$$(u_{\overline{x}})_\ell = \frac{215u_\ell-288u_{\ell-1}+36u_{\ell-2}+64u_{\ell-3}-27u_{\ell-4}}{132\ (\Delta\overline{x})} \tag{D-39}$$

APPENDIX E

A COPY OF THE COMPUTER PROGRAM

A copy of the computer program for Case II is included. Since the programs for the other three sets of boundary conditions are very similar, copies of these are not presented. Therefore, it will suffice to sequentially list the differences that do occur, namely:

1. Different dimensionless time increments. Table 3 dictates what time increments are to be read into each program.
2. Different boundary conditions. Statement No. 77 in the main line and the subroutine BOUNDS must be altered according to Table 1.
3. Different elements in the matrix (M) and the vector ($\vec{a}$). The subroutine MATRIX must be recalculated, as dictated by equations developed in Appendix D.
4. Different matrix size. Equations in Appendix D state the respective matrix sizes.
5. The production for Cases III and IV need not be terminated since the pressures in these systems do not drop below a value of zero.
6. The extent of the loop controlling the flow rate calculation must be altered so that calculations are performed only for those points where flow rates are unknown.

Computer Program Nomenclature

Subroutine BOUNDS - sets the boundary conditions.

Subroutine MATRIX - calculates the elements of the matrix and the known vector.

Subroutine SQROOT - inverts the matrix of nonlinear terms and multiplies it by the known vector. This yields the unknown vector $(\vec{u})_{m+1}$.

Subroutine MATBAL - calculates the material balance percentage errors at the specified time levels.

A	matrix of nonlinear terms (M)
AIN	cumulative mass flow into the reservoir
AOUT	cumulative mass flow out of the reservoir
AREA	area under the pressure distribution curve
AC BC CC	the terms a, b, c in the quadratic flow equation: $a(\overline{\rho q_x})^2 + b(\overline{\rho q_x}) + c = 0$
DC	the term $(b^2 - 4ac)$ from the above equation
B	dimensionless slip coefficient
BB	dimensionless inertial resistance coefficient
BA	vector of known quantities $(\vec{a})$
C	nonlinear term $C(u,u_{\bar{x}})$
CAVE	nonlinear term $C(u,u_{\bar{x}})$ at time level $(m+\frac{1}{2})$
D	nonlinear term $D(u,u_{\bar{x}})$
DAVE	nonlinear term $D(u,u_{\bar{x}})$ at time level $(m+\frac{1}{2})$

DIFF	absolute difference in mean pressure calculated by the two ways indicated
DX	dimensionless space increment
DTIME	dimensionless time increment
DT	dimensionless time increment
DB	increment in dimensionless slip coefficient
DBB	increment in dimensionless inertial resistance coefficient
E1	error criterion for convergence of pressure distributions ($=10^{-5}$)
EACH	absolute error in pressures for two adjacent iterations
ERR	average error in pressures at a grid point for two adjacent iterations
FLOW	dimensionless flow rate at the producing face
F1	boundary condition flag (which was not used)
F2	inertial resistance coefficient flag
F3	slip coefficient flag
F5	iteration number flag
K1 K2 KJJ	groups of variables used to reduce the length of the expressions for the matrix terms
II=JJ	number of rows and columns in the matrix, respectively
LL	number of grid points at any time level
MM	number of time steps
MC	time level at which material balance is to be performed
MB	final time step prior to reservoir depletion

P	dimensionless pressure, time level (m+1)
PP	dimensionless pressure, time level (m)
PMEAN PMEAN1	dimensionless mean pressure calculated from the pressure profiles
PMEAN2	dimensionless mean pressure calculated using flow rates
PCENT	percent error in material balance
PAVEI	average flow rate into reservoir for one time increment
PAVEO	average flow rate out of reservoir for one time increment
SUM	sum of the individual errors (i.e. $\sum$ EACH)
TIME	dimensionless time
U	dimensionless pressure-squared at (m+1)
UU	dimensionless pressure-squared at (m)
UO	equivalent to $u_{o,m}$
WX	$(\overline{\rho q_x})$ at time level (m+1)
WWX	$(\overline{\rho q_x})$ at time level (m)
WX1 WX2	solutions to the quadratic equation $a(\overline{\rho q_x})^2 + b(\overline{\rho q_x}) + c = 0$
Z	equivalent to (u)

The above summary of nomenclature does not include subroutine SQROOT. If this subroutine is treated as a black box whose purpose has already been stated, only the following variables must be known:

A	the matrix of nonlinear terms $(M)_{m+\frac{1}{2}}$
BA	the known vector $(\vec{a})$
M	the size of the matrix $(M)_{m+\frac{1}{2}}$
Y	the solution vector $(\vec{u})_{m+1}$

```
C
C CONSTANT TERMINAL RATE WITH SEALED EXTERNAL BOUNDARY
C
      REAL U,P,WX,CAVE,DAVE,PP,UU,BA,A,C(24,40),E1,EACH,SUM
     1,D(24,40),CC(24),BC(24),AC(24),DC(24),ERR(24),Z(24),
     2B,BB,FLOW,TIME,DTIME(40),PMEAN(40),WX1,WX2,WWX,DX,DT,
     3DB,DBB
      INTEGER LL,MM,F2,F3,F5,LLL,MMM,III,MC(10),MB
      COMMON U(24,40),P(24,40),WX(24,40),CAVE(24,40),DAVE(24
     1,40),PP(24,40),UU(24,40),BA(24),A(24,24),WWX(24,40),DX
     2,DT,FLOW
      COMMON F1,LL,MM
  100 FORMAT(7X,5E10.2)
  101 FORMAT(5X,2I7)
  102 FORMAT(1X,7F10.3)
  105 FORMAT(7X,5I6)
  200 FORMAT(' VALUES OF DX,DT,DB,DBB,E1,LL,MM')
  205 FORMAT(1H ,13X,'SLIP COEFF(B)=',F7.3,'  INERTIAL COEFF'
     1,'(BB)=',F7.3)
  207 FORMAT(1H0,35X,'PRESSURE SQUARED DISTRIBUTION')
  210 FORMAT(1H ,45X,'FLOWRATE DISTRIBUTION')
  213 FORMAT(30X,'PROBLEM WILL NOT CONVERGE')
  220 FORMAT(14X,'TIME',32X,'DISTANCE(X)= ',35X,'PMEAN')
  221 FORMAT(14X,'(TD)    0.00   0.10   0.20   0.30   0.40 '
     1,'  0.50   0.60   0.70   0.80   0.90   1.00  (PM) ')
  222 FORMAT(12X,F6.3,1X,11F7.3)
  223 FORMAT(1X,'    ')
  224 FORMAT(12X,F6.3,1X,12F7.3)
  230 FORMAT('-')
  231 FORMAT('1')
  403 FORMAT('0WX(L,M+1) IS MULTIVALUED AT M=   ',I5)
      READ(5,100)DX,DT,DB,DBB,E1
      READ(5,101)LL,MM
      READ(5,105)(MC(I),I=1,5)
      WRITE(6,200)
      WRITE(6,100)DX,DT,DB,DBB,E1
      WRITE(6,101)LL,MM
      WRITE(6,105)(MC(I),I=1,5)
      READ(5,102)(DTIME(M),M=1,MM)
      WRITE(6,102)(DTIME(M),M=1,MM)
C
C SETTING DIMENSIONLESS FLOWRATE
   77 FLOW=-0.10
C
C SETTING SLIP COEFFICIENT(B)
      F3=0
      B=-0.19999E+00
    1 F3=F3+1
      B=B+DB
C
C SETTING INERTIAL COEFFICIENT (BB)
      F2=0
      BB=-0.99999E+01
    2 F2=F2+1
```

```
      BB=BB+DBB
      CALL BOUNDS (B,BB)
      LLL=LL-1
      MMM=MM-1
      TIME=0.0
      DO 99 M=1,MMM
      DT=DTIME(M)
      TIME=TIME+DTIME(M)
C
C CALCULATING  NONLINEAR COEFFICIENTS (C&D) AT TIMESTEP (M)
      DO 4 L=1,LL
      C(L,M)=P(L,M)*(P(L,M)+B)/(P(L,M)+4.*BB*(P(L,M)+B)*
     1ABS(WX(L,M)))
      D(L,M)=B*WX(L,M)/((P(L,M)+B)*(P(L,M)+4.*BB*(P(L,M)+B)*
     1ABS(WX(L,M))))
C
C STORING FIRST GUESS AT (P) AND (WX) AT TIMESTEP (M+1)
      PP(L,M+1)=P(L,M)
      UU(L,M+1)=U(L,M)
      WWX(L,M+1)=WX(L,M)
    4 CONTINUE
      PP(LL+1,M+1)=PP(LL-1,M+1)
      UU(LL+1,M+1)=UU(LL-1,M+1)
      WWX(1,M+1)=FLOW
      F5=0
   24 CONTINUE
C
C CALCULATING THE NONLINEAR COEFFICIENTS (C&D) AT (M+1)
      DO 5 L=1,LL
      C(L,M+1)=PP(L,M+1)*(PP(L,M+1)+B)/(PP(L,M+1)+4.*BB*(PP
     1(L,M+1)+B)*ABS(WWX(L,M+1)))
      D(L,M+1)=B*WWX(L,M+1)/((PP(L,M+1)+B)*(PP(L,M+1)+4.*BB*
     1(PP(L,M+1)+B)*ABS(WWX(L,M+1))))
      CAVE(L,M)=(C(L,M)+C(L,M+1))/2.0
    5 DAVE(L,M)=(D(L,M)+D(L,M+1))/2.0
C
C COMPUTING SQUARE MATRIX (A) AT TIMESTEP (M+1)
      CALL MATRIX (B,BB,M)
      CALL SQROOT (Z)
C
C SETTING PRESSURES AT (M+1) FOR L=1,LL+1
      DO 6 L=1,LL
      U(L,M+1)=Z(L)
      IF(U(1,M+1).GT.0.005)GO TO 6
C
C TERMINATE PRODUCTION
      DO 69 L=1,LL
      WX(L,M+1)=0.10E-05
      U(L,M+1)=0.005
   69 CONTINUE
      PMEAN(M+1)=0.005
      GO TO 94
    6 P(L,M+1)=SQRT(U(L,M+1))
C
```

```
C CALCULATING THE FLOWRATE AT TIMESTEP (M+1)
      DO 7 L=2,LLL
      IF(L.GE.LLL)GO TO 20
      CC(L)=(-U(L+2,M+1)+6.*U(L+1,M+1)-3.*U(L,M+1)-2.*U(L-1,
     1M+1))/(6.*DX)
      GO TO 19
   20 CC(L)=(2.*U(L+1,M+1)+3.*U(L,M+1)-6.*U(L-1,M+1)+U(L-2,
     1M+1))/(6.*DX)
   19 CONTINUE
      BC(L)=-2.0*P(L,M+1)/(P(L,M+1)+B)
      AC(L)=-4.0*BB
      DC(L)=SQRT(BC(L)*BC(L)-4.0*AC(L)*CC(L))
      IF(CC(L).LE.0.10E-03)GO TO 17
C
C ALTERNATIVE FOR QUADRATIC CONSTANT = 0.00
      IF(ABS(AC(L)).GT.0.10E-03)GO TO 15
      WX(L,M+1)=-1.0*(-CC(L)/BC(L))
      GO TO 7
   15 WX1=-(-BC(L)-DC(L))/(2.0*AC(L))
      WX2=-(-BC(L)+DC(L))/(2.0*AC(L))
      IF((WX1+ABS(WX1)).LT.0.10E-04)GO TO 8
      IF((WX2+ABS(WX2)).LT.0.10E-04)GO TO 9
    8 WX(L,M+1)=WX1
      IF((WX2+ABS(WX2)).LT.0.10E-04)WRITE(6,403)M
      GO TO 7
   17 WX(L,M+1)=0.10E-05
      GO TO 7
    9 WX(L,M+1)=WX2
    7 CONTINUE
C
C CHECKING TO SEE IF NONLINEAR TERM HAS CONVERGED
      SUM=0.0
      DO 10 L=1,LL
      ERR(L)=ABS(PP(L,M+1)-P(L,M+1))
   10 SUM=SUM+ERR(L)
      EACH=SUM/FLOAT(LL)
      DO 13 L=1,LL
      PP(L,M+1)=P(L,M+1)
      UU(L,M+1)=U(L,M+1)
   13 WWX(L,M+1)=WX(L,M+1)
      IF(EACH.LE.E1)GO TO 11
      F5=F5+1
      IF(F5.GT.10)GO TO 12
      GO TO 24
   11 CONTINUE
C
C PROBLEM HAS CONVERGED FOR TIMESTEP (M+1)
C CALCULATING P(MEAN) FROM PRESSURE DISTIBUTION(=PMEAN1)
      PMEAN(M+1)=0.00
      DO 33 L=2,LLL,2
      AREA=0.050*(P(L-1,M+1)+4.0*P(L,M+1)+P(L+1,M+1))/3.00
      PMEAN(M+1)=PMEAN(M+1)+AREA
   33 CONTINUE
      GO TO 99
```

```
C
C PROBLEM WILL NCT CONVERGE
   12 WRITE(6,213)
      GO TO 98
   99 CONTINUE
C
C WRITING OUT FOR ALL TIMESTEPS
   94 CONTINUE
      MB=M-1
      WRITE(6,231)
      WRITE(6,230)
      WRITE(6,230)
      WRITE(6,205)B,BB
      WRITE(6,207)
      WRITE(6,220)
      WRITE(6,221)
      WRITE(6,223)
      TIME=0.00
      DO 78 M=1,MB
      TIME=TIME+DTIME(M)
      WRITE(6,224)TIME,(U(L,M+1),L=1,LL,2),PMEAN(M+1)
   78 CONTINUE
      WRITE(6,231)
      WRITE(6,230)
      WRITE(6,230)
      WRITE(6,205)B,BB
      WRITE(6,210)
      WRITE(6,223)
      TIME=0.00
      DO 79 M=1,MB
      TIME=TIME+DTIME(M)
      WRITE(6,222)TIME,(WX(L,M+1),L=1,LL,2)
   79 CONTINUE
      CALL MATBAL (MC,DTIME,PMEAN)
C
C CHECKING EXTENT OF INERTIAL TERM
      IF(F2.GE.6)GO TO 98
      GO TO 2
   98 CONTINUE
C
C CHECKING EXTENT OF SLIP TERM
      IF(F3.GE.3)GO TO 97
      GO TO 1
   97 CONTINUE
      STOP
      END
```

```
      SUBROUTINE BOUNDS (B,BB)
      REAL U,P,WX,FLOW
      INTEGER F1,LL,MM
      COMMON U(24,40),P(24,40),WX(24,40),CAVE(24,40),DAVE(24
     1,40),PP(24,40),UU(24,40),BA(24),A(24,24),WWX(24,40),DX
     2,DT,FLOW
      COMMON F1,LL,MM
C
C SECOND SET OF BOUNDARY CONDITIONS
      DO 10 L=1,LL
      P(L,1)=1.0
      WX(L,1)=0.10E-05
   10 U(L,1)=P(L,1)*P(L,1)
      P(LL+1,1)=P(LL-1,1)
      U(LL+1,1)=U(LL-1,1)
      DO 13 M=2,MM
      WX(LL,M)=0.10E-05
   13 WX(1,M)=FLOW
      RETURN
      END
```

```
      SUBROUTINE MATRIX (B,BB,M)
      REAL U,P,WX,CAVE,DAVE,BA,A,UO(24),K1(40),K2(40),KJJ(40),
     1DX,DT,B,BB,PP,UU,WWX
      INTEGER II,JJ,LL,JJJ,F1,III
      COMMON U(24,40),P(24,40),WX(24,40),CAVE(24,40),DAVE(24
     1,40),PP(24,40),UU(24,40),BA(24),A(24,24),WWX(24,40),DX
     2,DT,FLOW
      COMMON F1,LL,MM
      II=LL
      JJ=LL
      DO 6 J=1,JJ
      DO 6 I=1,II
    6 A(I,J)=0.0
C
C SETTING FIRST AND LAST ROW OF MATRIX (A) AND KNOWN VECTOR (BA)
      UO(M)=2.0*DX*(2.*P(1,M)*WX(1,M)/(P(1,M)+B)+4.*BB*WX(1,
     1M)*ABS(WX(1,M)))+U(2,M)
      K1(M)=CAVE(1,M)*(U(2,M)-2.*U(1,M)+UO(M))/(2.*DX*DX)+
     1DAVE(1,M)*(U(2,M)-UO(M))/(4.*DX)+U(1,M)/DT
      K2(M)=-2.*DX*(CAVE(1,M)/(2.*DX*DX)-DAVE(1,M)/(4.*DX))*
     1(2.*PP(1,M+1)*WX(1,M+1)/(PP(1,M+1)+B)+4.*BB*WX(1,M+1)*
     2ABS(WX(1,M+1)))
      A(1,1)=1.0/DT+CAVE(1,M)/(DX*DX)
      A(1,2)=-CAVE(1,M)/(DX*DX)
      BA(1)=K1(M)-K2(M)
      A(II,JJ-1)=- CAVE(LL,M)/(DX*DX)
      A(II,JJ)=(1.0/DT+CAVE(LL,M)/(DX*DX))
      KJJ(M)=CAVE(LL,M)*(2.0*U(LL-1,M)-2.0*U(LL,M))/(2.*DX*
     1DX)+U(LL,M)/DT
      BA(II)=KJJ(M)
C
C SETTING THE REST OF THE DIAGONALS TO APPROPRIATE VALUES
      III=II-1
      DO 12 I=2,III
      DO 13 J=1,JJ
      IF(I.EQ.J)GO TO 9
      IF(ABS(I-J).NE.1)GO TO 13
      IF(J.GT.I)GO TO 7
      A(I,J)=-CAVE(I,M)/(2.*DX*DX)+DAVE(I,M)/(4.*DX)
      GO TO 13
    9 A(I,J)=1.0/DT+CAVE(I,M)/(DX*DX)
      GO TO 13
    7 A(I,J)=-CAVE(I,M)/(2.0*DX*DX)-DAVE(I,M)/(4.*DX)
   13 CONTINUE
      BA(I)=(CAVE(I,M)/(2.*DX*DX))*(U(I+1,M)-2.*U(I,M)+U(I-1
     1,M))+(DAVE(I,M)/(4.*DX))*(U(I+1,M)-U(I-1,M))+U(I,M)/DT
   12 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE SQROOT (Y)
      REAL A,BA,AL(24,24),AM(24,24),AU(24,24),AV(24,24),
     1AA(24,24),BB(24),Y(24),DIF(24),PCENT(24),XIS,VALUE,ZX
     2,ZXX,ZV,ZW,ZQ,ZR,BOB
      INTEGER M,KK,KP,IJN,JP,JLNGTH,K,KL,JK,J
      COMMON U(24,40),P(24,40),WX(24,40),CAVE(24,40),DAVE(24
     1,40),PP(24,40),UU(24,40),BA(24),A(24,24),WWX(24,40),DX
     2,DT,FLOW
      COMMON F1,LL,MM
  151 FORMAT(1H ,29H THE METHOD IS NOT APPLICABLE)
      M=LL
      DO 1 I=1,M
      DO 2 J=1,M
    2 AA(I,J)=A(I,J)
    1 BB(I)=BA(I)
C
C     CALCULATION OF L AND U
      DO 105 K=2,M
      KK=K-1
      DO 104 J=1,KK
      AL(J,K)=0.0
      AM(J,K)=0.0
      AU(K,J)=0.0
  104 AV(K,J)=0.0
  105 CONTINUE
      IF(A(1,1).EQ.0.) GO TO 150
  106 XIS=ABS(A(1,1))
      AL(1,1)=SQRT(XIS)
      AU(1,1)=A(1,1)/AL(1,1)
      DO 107 J=2,M
      AU(1,J)=A(1,J)/AL(1,1)
  107 AL(J,1)=A(J,1)/AU(1,1)
      DO 115 K=2,M
      KK=K-1
      VALUE=0.0
      DO 108 J=1,KK
  108 VALUE=VALUE+AL(K,J)*AU(J,K)
      ZX=A(K,K)-VALUE
      IF(ZX.EQ.0.) GO TO 150
  109 ZXX=ABS(ZX)
      AL(K,K)=SQRT(ZXX)
      AU(K,K)=ZX/AL(K,K)
      KP=K+1
      KK=K-1
      IF(KP.GT.M ) GO TO 115
      DO 112 I=KP,M
      ZV=0.0
      ZW=0.0
      DO 110 LP=1,KK
      ZV=ZV+AL(K,LP)*AU(LP,I)
  110 ZW=ZW+AL(I,LP)*AU(LP,K)
      AU(K,I)=(A(K,I)-ZV)/AL(K,K)
  112 AL(I,K)=(A(I,K)-ZW)/AU(K,K)
  115 CONTINUE
```

```
C
C     L AND U ARE CALCULATED
C     PROCEEDING TO CALCULATE L-INVERSE AND U-INVERSE
      DO 119 K=1,M
      AM(K,K)=1.0/AL(K,K)
  119 AV(K,K)=1.0/AU(K,K)
      DO 125 K=2,M
      KK=K-1
      DO 122 J=1,KK
      ZQ=0.0
      DO 120 L=J,KK
  120 ZQ=ZQ+AL(K,L)*AM(L,J)
  122 AM(K,J)=-ZQ/AL(K,K)
  125 CONTINUE
      IJN=M+1
      DO 135 KL=1,IJN
      K=IJN-KL
      IF(K.LE.1) GO TO 136
  126 DO 130 JK=1,K
      J=K-JK
      IF(J.LT.1) GO TO 135
  127 ZR=0.0
      JP=J+1
      DO 128 L=JP,K
  128 ZR=ZR+AU(J,L)*AV(L,K)
  130 AV(J,K)=-ZR/AU(J,J)
  135 CONTINUE
C
C     PROCEEDING TO CALCULATE G-INVERSE=U-INVERSE*L-INVERSE
  136 DO 140 K=1,M
      DO 140 J=1,M
      A(J,K)=0.0
      DO 137 L=1,M
  137 A(J,K)=A(J,K)+AV(J,L)*AM(L,K)
  140 CONTINUE
      GO TO 152
  150 WRITE(6,151)
  152 CONTINUE
      DO 153 I=1,M
      Y(I)=0.
      DO 153 J=1,M
  153 Y(I)=Y(I)+A(I,J)*BA(J)
      DO 9 J=1,M
      BOB=0.
      DO 12 I=1,M
   12 BOB=BOB+AA(J,I)*Y(I)
      DIF(J)=BB(J)-BOB
      PCENT(J)=DIF(J)*100./BB(J)
    9 CONTINUE
  202 RETURN
      END
```

```
      SUBROUTINE MATBAL (MC,DTIME,PMEAN)
      REAL P,U,WX,TD,TIME(6),PMEAN1,PMEAN2,AREA,AIN,AOUT,OUT
     1,IN,REOUT,REIN,DIFF,PCENT(6),DTIME(40),PAVEO,PAVEI
     2,PMEAN(40)
      INTEGER M,MC(10),LL,LLL,K,II,MG
      COMMON U(24,40),P(24,40),WX(24,40),CAVE(24,40),DAVE(24
     1,40),PP(24,40),UU(24,40),BA(24),A(24,24),WWX(24,40),DX
     2,DT,FLOW
      COMMON F1,LL,MM
  200 FORMAT(1H0,26X,'MATERIAL BALANCE CALCULATIONS-% ERROR')
  201 FORMAT(1H0,21X,'(TD)= 0.100     0.500     1.000     3.000',
     1'     6.000')
  202 FORMAT(24X,5F8.3)
      II=5
      LLL=LL-1
C
C BALANCE ON 5 DIFFERENT DIMENSIONLESS TIMES
      DO 20 I=1,II
      M=MC(I)
C
C CALCULATING P(MEAN) FROM PRESSURE DISTIBUTION(=PMEAN1)
      PMEAN1=PMEAN(M)
C
C CALCULATING P(MEAN) FROM FLOWRATES (=PMEAN2)
      AIN=0.00
      AOUT=0.00
      MG=M-1
      DO 15 K=1,MG
      PAVEO=ABS(WX(1,K)+WX(1,K+1))/2.0
      PAVEI=ABS(WX(LL,K)+WX(LL,K+1))/2.0
      OUT=PAVEO*DTIME(K)
      IN=PAVEI*DTIME(K)
      AOUT=AOUT+OUT
      AIN=AIN+IN
   15 CONTINUE
      PMEAN2=1.00-AOUT+AIN
C
C CALCULATING PERCENT ERROR IN MATERIAL BALANCE
   60 DIFF=ABS(PMEAN1-PMEAN2)
      PCENT(I)=100.0*DIFF/PMEAN1
   20 CONTINUE
      WRITE(6,200)
      WRITE(6,201)
      WRITE(6,202)(PCENT(I),I=1,II)
      RETURN
      END
```

A P P E N D I X   F

COMPUTER RESULTS

The computer results that are presented in this section were obtained employing the optimal grid spacing, namely:

$$\Delta \bar{x} = 0.05$$

$$\Delta t_D = (\Delta t_D)_A$$

Results for all four sets of boundary conditions considered are included.

CASE I - CONSTANT TERMINAL RATE
WITH A CONSTANT PRESSURE AT THE
EXTERNAL BOUNDARY $(\overline{\rho q_x})_w = -0.10$

SLIP COEFF(B)= 0.0   INERTIAL COEFF(BB)= 0.0

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.981	0.993	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999
0.040	0.960	0.978	0.989	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.997
0.060	0.951	0.967	0.980	0.989	0.994	0.997	0.999	0.999	1.000	1.000	1.000	0.995
0.100	0.932	0.951	0.965	0.976	0.985	0.990	0.994	0.997	0.998	0.999	1.000	0.991
0.150	0.917	0.935	0.950	0.963	0.973	0.981	0.987	0.992	0.995	0.998	1.000	0.987
0.200	0.902	0.922	0.938	0.951	0.963	0.972	0.980	0.986	0.991	0.996	1.000	0.982
0.250	0.891	0.910	0.927	0.941	0.953	0.964	0.973	0.981	0.988	0.994	1.000	0.979
0.300	0.881	0.900	0.917	0.932	0.945	0.957	0.967	0.977	0.985	0.993	1.000	0.975
0.400	0.864	0.883	0.901	0.917	0.931	0.945	0.957	0.969	0.980	0.990	1.000	0.970
0.500	0.850	0.870	0.888	0.905	0.921	0.936	0.949	0.963	0.975	0.988	1.000	0.965
0.600	0.840	0.859	0.878	0.896	0.912	0.928	0.943	0.958	0.972	0.986	1.000	0.962
0.800	0.825	0.845	0.864	0.882	0.900	0.918	0.935	0.951	0.968	0.984	1.000	0.957
1.000	0.816	0.835	0.855	0.874	0.893	0.911	0.929	0.947	0.965	0.982	1.000	0.954
1.200	0.810	0.830	0.849	0.869	0.888	0.907	0.926	0.944	0.963	0.982	1.000	0.952
1.500	0.805	0.825	0.845	0.864	0.884	0.903	0.923	0.942	0.962	0.981	1.000	0.950
2.000	0.801	0.822	0.841	0.861	0.881	0.901	0.921	0.941	0.960	0.980	1.000	0.949
2.500	0.801	0.820	0.841	0.861	0.880	0.900	0.920	0.940	0.960	0.980	1.000	0.948
3.000	0.800	0.820	0.840	0.860	0.880	0.900	0.920	0.940	0.960	0.980	1.000	0.948
3.500	0.800	0.820	0.840	0.860	0.880	0.900	0.920	0.940	0.960	0.980	1.000	0.948
4.000	0.800	0.820	0.840	0.860	0.880	0.900	0.920	0.940	0.960	0.980	1.000	0.948
5.000	0.800	0.820	0.840	0.860	0.880	0.900	0.920	0.940	0.960	0.980	1.000	0.948
6.000	0.800	0.820	0.840	0.860	0.880	0.900	0.920	0.940	0.960	0.980	1.000	0.948
8.000	0.800	0.820	0.840	0.860	0.880	0.900	0.920	0.940	0.960	0.980	1.000	0.948
10.000	0.800	0.820	0.840	0.860	0.880	0.900	0.920	0.940	0.960	0.980	1.000	0.948

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 0.0

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.036	-0.013	-0.005	-0.002	-0.001	-0.000	-0.000	0.0	0.0	0.0
0.040	-0.100	-0.073	-0.040	-0.020	-0.009	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.060	-0.100	-0.074	-0.054	-0.034	-0.020	-0.011	-0.005	-0.003	-0.001	-0.001	-0.000
0.100	-0.100	-0.082	-0.063	-0.048	-0.035	-0.024	-0.015	-0.010	-0.006	-0.004	-0.003
0.150	-0.100	-0.084	-0.071	-0.057	-0.045	-0.035	-0.026	-0.020	-0.015	-0.012	-0.011
0.200	-0.100	-0.087	-0.074	-0.063	-0.052	-0.043	-0.035	-0.028	-0.024	-0.021	-0.020
0.250	-0.100	-0.089	-0.078	-0.067	-0.058	-0.049	-0.042	-0.037	-0.032	-0.030	-0.029
0.300	-0.100	-0.090	-0.080	-0.071	-0.063	-0.055	-0.049	-0.044	-0.040	-0.038	-0.037
0.400	-0.100	-0.092	-0.085	-0.077	-0.070	-0.064	-0.060	-0.056	-0.053	-0.051	-0.050
0.500	-0.100	-0.094	-0.087	-0.082	-0.077	-0.072	-0.068	-0.065	-0.063	-0.061	-0.061
0.600	-0.100	-0.095	-0.090	-0.086	-0.081	-0.078	-0.075	-0.072	-0.070	-0.069	-0.069
0.800	-0.100	-0.097	-0.094	-0.091	-0.088	-0.086	-0.084	-0.083	-0.081	-0.081	-0.080
1.000	-0.100	-0.098	-0.096	-0.094	-0.093	-0.091	-0.090	-0.089	-0.088	-0.088	-0.088
1.200	-0.100	-0.099	-0.097	-0.096	-0.095	-0.094	-0.094	-0.093	-0.093	-0.092	-0.092
1.500	-0.100	-0.100	-0.099	-0.098	-0.098	-0.097	-0.097	-0.097	-0.096	-0.096	-0.096
2.000	-0.100	-0.100	-0.100	-0.100	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099
2.500	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
3.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
3.500	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
4.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
5.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
6.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
8.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
10.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.005	0.016	0.026	0.069

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.955	0.986	0.996	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.998
0.040	0.932	0.972	0.988	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.996
0.060	0.916	0.959	0.980	0.990	0.995	0.997	0.999	0.999	1.000	1.000	1.000	0.994
0.100	0.891	0.937	0.964	0.979	0.988	0.993	0.996	0.998	0.999	0.999	1.000	0.993
0.150	0.866	0.915	0.946	0.966	0.978	0.986	0.991	0.995	0.997	0.999	1.000	0.985
0.200	0.845	0.896	0.930	0.953	0.968	0.979	0.986	0.991	0.995	0.997	1.000	0.981
0.250	0.828	0.879	0.915	0.941	0.959	0.971	0.980	0.987	0.992	0.996	1.000	0.974
0.300	0.811	0.863	0.901	0.929	0.949	0.964	0.974	0.983	0.989	0.995	1.000	0.972
0.400	0.783	0.836	0.876	0.907	0.931	0.949	0.963	0.974	0.984	0.992	1.000	0.964
0.500	0.758	0.812	0.854	0.888	0.914	0.935	0.952	0.967	0.979	0.990	1.000	0.957
0.600	0.736	0.791	0.835	0.870	0.899	0.923	0.942	0.959	0.974	0.987	1.000	0.951
0.800	0.699	0.754	0.800	0.839	0.872	0.900	0.924	0.945	0.965	0.983	1.000	0.939
1.000	0.668	0.723	0.771	0.813	0.849	0.880	0.908	0.933	0.956	0.979	1.000	0.929
1.200	0.641	0.697	0.746	0.790	0.828	0.863	0.894	0.922	0.949	0.975	1.000	0.920
1.500	0.607	0.664	0.715	0.761	0.803	0.841	0.876	0.909	0.940	0.970	1.000	0.908
2.000	0.563	0.621	0.674	0.723	0.769	0.811	0.852	0.890	0.928	0.964	1.000	0.892
2.500	0.530	0.588	0.643	0.694	0.743	0.789	0.834	0.876	0.918	0.959	1.000	0.880
3.000	0.505	0.563	0.619	0.672	0.723	0.772	0.819	0.866	0.911	0.956	1.000	0.871
3.500	0.485	0.544	0.600	0.655	0.707	0.758	0.808	0.857	0.905	0.953	1.000	0.864
4.000	0.469	0.528	0.585	0.641	0.695	0.748	0.799	0.850	0.900	0.950	1.000	0.857
5.000	0.446	0.506	0.564	0.621	0.677	0.732	0.786	0.840	0.894	0.947	1.000	0.849
6.000	0.431	0.491	0.550	0.607	0.665	0.722	0.778	0.834	0.889	0.945	1.000	0.843
8.000	0.414	0.474	0.533	0.592	0.651	0.710	0.768	0.826	0.884	0.942	1.000	0.836
10.000	0.406	0.466	0.526	0.586	0.645	0.704	0.764	0.823	0.882	0.941	1.000	0.832

SLIP COEFF(B)= 0.0   INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.043	-0.018	-0.007	-0.003	-0.001	-0.000	-0.000	-0.000	0.0	0.0
0.040	-0.100	-0.058	-0.031	-0.016	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.060	-0.100	-0.065	-0.040	-0.023	-0.014	-0.008	-0.004	-0.002	-0.001	-0.001	-0.000
0.100	-0.100	-0.072	-0.050	-0.034	-0.022	-0.015	-0.009	-0.006	-0.004	-0.003	-0.002
0.150	-0.100	-0.077	-0.057	-0.042	-0.030	-0.022	-0.016	-0.011	-0.008	-0.007	-0.006
0.200	-0.100	-0.080	-0.062	-0.048	-0.036	-0.027	-0.021	-0.016	-0.013	-0.011	-0.010
0.250	-0.100	-0.082	-0.066	-0.052	-0.041	-0.032	-0.025	-0.021	-0.017	-0.015	-0.015
0.300	-0.100	-0.083	-0.068	-0.055	-0.045	-0.036	-0.030	-0.025	-0.021	-0.019	-0.018
0.400	-0.100	-0.086	-0.072	-0.061	-0.051	-0.043	-0.036	-0.031	-0.028	-0.026	-0.025
0.500	-0.100	-0.087	-0.075	-0.065	-0.056	-0.048	-0.042	-0.037	-0.034	-0.032	-0.031
0.600	-0.100	-0.088	-0.077	-0.068	-0.059	-0.052	-0.047	-0.042	-0.039	-0.037	-0.037
0.800	-0.100	-0.090	-0.081	-0.073	-0.065	-0.059	-0.054	-0.050	-0.048	-0.046	-0.045
1.000	-0.100	-0.091	-0.083	-0.076	-0.070	-0.064	-0.060	-0.057	-0.054	-0.053	-0.052
1.200	-0.100	-0.092	-0.085	-0.079	-0.073	-0.069	-0.065	-0.062	-0.060	-0.058	-0.058
1.500	-0.100	-0.094	-0.088	-0.082	-0.078	-0.074	-0.070	-0.068	-0.066	-0.065	-0.065
2.000	-0.100	-0.095	-0.091	-0.087	-0.083	-0.080	-0.077	-0.075	-0.074	-0.073	-0.073
2.500	-0.100	-0.096	-0.093	-0.089	-0.087	-0.084	-0.082	-0.081	-0.080	-0.079	-0.079
3.000	-0.100	-0.097	-0.094	-0.092	-0.089	-0.088	-0.086	-0.085	-0.084	-0.083	-0.083
3.500	-0.100	-0.098	-0.095	-0.093	-0.092	-0.090	-0.089	-0.088	-0.087	-0.087	-0.087
4.000	-0.100	-0.098	-0.096	-0.095	-0.093	-0.092	-0.091	-0.090	-0.090	-0.089	-0.089
5.000	-0.100	-0.099	-0.097	-0.096	-0.095	-0.095	-0.094	-0.094	-0.093	-0.093	-0.093
6.000	-0.100	-0.099	-0.098	-0.098	-0.097	-0.096	-0.096	-0.096	-0.095	-0.095	-0.095
8.000	-0.100	-0.100	-0.099	-0.099	-0.099	-0.098	-0.098	-0.098	-0.098	-0.098	-0.098
10.000	-0.100	-0.100	-0.100	-0.100	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.099	0.103	0.102	0.091

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.928	0.980	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.997
0.040	0.905	0.966	0.987	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.995
0.060	0.887	0.952	0.979	0.990	0.995	0.998	0.999	0.999	1.000	1.000	1.000	0.993
0.100	0.857	0.929	0.964	0.981	0.989	0.994	0.997	0.998	0.999	1.000	1.000	0.988
0.150	0.827	0.903	0.945	0.968	0.981	0.988	0.993	0.996	0.997	0.999	1.000	0.984
0.200	0.802	0.881	0.928	0.955	0.972	0.982	0.988	0.993	0.996	0.998	1.000	0.980
0.250	0.780	0.861	0.911	0.943	0.963	0.975	0.984	0.989	0.994	0.997	1.000	0.975
0.300	0.761	0.842	0.896	0.931	0.953	0.968	0.978	0.986	0.991	0.996	1.000	0.971
0.400	0.725	0.809	0.868	0.907	0.935	0.954	0.968	0.979	0.987	0.994	1.000	0.962
0.500	0.695	0.780	0.842	0.886	0.917	0.940	0.958	0.971	0.982	0.991	1.000	0.954
0.600	0.668	0.754	0.818	0.866	0.901	0.927	0.947	0.964	0.977	0.989	1.000	0.947
0.800	0.620	0.708	0.776	0.829	0.870	0.902	0.928	0.949	0.968	0.984	1.000	0.933
1.000	0.579	0.668	0.739	0.796	0.842	0.879	0.909	0.935	0.959	0.980	1.000	0.920
1.200	0.543	0.633	0.707	0.767	0.816	0.857	0.892	0.923	0.950	0.976	1.000	0.908
1.500	0.497	0.588	0.664	0.728	0.782	0.829	0.869	0.905	0.939	0.970	1.000	0.892
2.000	0.432	0.525	0.605	0.674	0.734	0.788	0.836	0.880	0.922	0.961	1.000	0.869
2.500	0.381	0.474	0.557	0.630	0.695	0.754	0.809	0.860	0.908	0.954	1.000	0.850
3.000	0.338	0.432	0.517	0.593	0.662	0.726	0.786	0.842	0.896	0.948	1.000	0.833
3.500	0.302	0.397	0.483	0.562	0.634	0.702	0.766	0.827	0.886	0.943	1.000	0.819
4.000	0.271	0.367	0.454	0.535	0.610	0.681	0.749	0.814	0.877	0.939	1.000	0.806
5.000	0.222	0.318	0.407	0.492	0.572	0.648	0.722	0.793	0.863	0.932	1.000	0.784
6.000	0.184	0.280	0.372	0.459	0.542	0.622	0.700	0.777	0.852	0.926	1.000	0.767
8.000	0.130	0.227	0.321	0.411	0.499	0.586	0.670	0.754	0.836	0.918	1.000	0.742
10.000	0.094	0.192	0.288	0.381	0.472	0.562	0.651	0.739	0.826	0.913	1.000	0.722

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.045	-0.020	-0.008	-0.003	-0.001	-0.000	-0.000	-0.000	0.0	0.0
0.040	-0.100	-0.054	-0.028	-0.015	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.060	-0.100	-0.060	-0.035	-0.020	-0.012	-0.007	-0.004	-0.002	-0.001	-0.001	-0.000
0.100	-0.100	-0.067	-0.043	-0.028	-0.018	-0.012	-0.008	-0.005	-0.003	-0.002	-0.002
0.150	-0.100	-0.072	-0.051	-0.035	-0.024	-0.017	-0.012	-0.009	-0.006	-0.005	-0.005
0.200	-0.100	-0.075	-0.055	-0.040	-0.029	-0.021	-0.016	-0.012	-0.009	-0.008	-0.008
0.250	-0.100	-0.077	-0.059	-0.044	-0.033	-0.025	-0.019	-0.015	-0.012	-0.011	-0.010
0.300	-0.100	-0.079	-0.062	-0.048	-0.037	-0.029	-0.023	-0.018	-0.015	-0.014	-0.013
0.400	-0.100	-0.082	-0.066	-0.053	-0.042	-0.034	-0.028	-0.024	-0.020	-0.019	-0.018
0.500	-0.100	-0.083	-0.069	-0.057	-0.047	-0.039	-0.033	-0.028	-0.025	-0.023	-0.023
0.600	-0.100	-0.085	-0.071	-0.060	-0.050	-0.043	-0.037	-0.032	-0.029	-0.027	-0.027
0.800	-0.100	-0.087	-0.075	-0.064	-0.056	-0.049	-0.043	-0.039	-0.036	-0.034	-0.033
1.000	-0.100	-0.088	-0.077	-0.068	-0.060	-0.053	-0.048	-0.044	-0.041	-0.040	-0.039
1.200	-0.100	-0.089	-0.079	-0.071	-0.063	-0.057	-0.052	-0.049	-0.046	-0.045	-0.044
1.500	-0.100	-0.090	-0.082	-0.074	-0.068	-0.062	-0.058	-0.054	-0.052	-0.051	-0.050
2.000	-0.100	-0.092	-0.085	-0.078	-0.073	-0.068	-0.064	-0.062	-0.060	-0.059	-0.058
2.500	-0.100	-0.093	-0.087	-0.081	-0.077	-0.073	-0.069	-0.067	-0.065	-0.064	-0.064
3.000	-0.100	-0.094	-0.088	-0.084	-0.079	-0.076	-0.073	-0.071	-0.070	-0.069	-0.069
3.500	-0.100	-0.094	-0.090	-0.085	-0.082	-0.079	-0.077	-0.075	-0.074	-0.073	-0.073
4.000	-0.100	-0.095	-0.091	-0.087	-0.084	-0.081	-0.079	-0.078	-0.077	-0.076	-0.076
5.000	-0.100	-0.096	-0.092	-0.089	-0.087	-0.085	-0.083	-0.082	-0.081	-0.081	-0.081
6.000	-0.100	-0.097	-0.094	-0.091	-0.089	-0.088	-0.086	-0.086	-0.085	-0.084	-0.084
8.000	-0.100	-0.097	-0.095	-0.094	-0.093	-0.092	-0.091	-0.090	-0.090	-0.089	-0.089
10.000	-0.100	-0.098	-0.097	-0.096	-0.095	-0.094	-0.093	-0.093	-0.093	-0.092	-0.092

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.197	0.210	0.216	0.221

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.902	0.973	0.992	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.996
0.040	0.878	0.959	0.985	0.994	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.994
0.060	0.859	0.946	0.978	0.990	0.995	0.998	0.999	0.999	1.000	1.000	1.000	0.992
0.100	0.826	0.921	0.963	0.981	0.990	0.994	0.997	0.998	0.999	1.000	1.000	0.988
0.150	0.793	0.894	0.944	0.969	0.982	0.989	0.994	0.996	0.998	0.999	1.000	0.983
0.200	0.765	0.870	0.927	0.957	0.974	0.984	0.990	0.994	0.996	0.998	1.000	0.978
0.250	0.740	0.848	0.910	0.945	0.965	0.978	0.986	0.991	0.995	0.997	1.000	0.974
0.300	0.718	0.827	0.893	0.933	0.956	0.971	0.981	0.988	0.993	0.997	1.000	0.969
0.400	0.678	0.791	0.863	0.909	0.939	0.958	0.972	0.981	0.989	0.995	1.000	0.961
0.500	0.643	0.758	0.835	0.887	0.921	0.945	0.962	0.974	0.984	0.992	1.000	0.952
0.600	0.611	0.728	0.809	0.865	0.904	0.932	0.952	0.967	0.980	0.990	1.000	0.944
0.800	0.556	0.676	0.763	0.826	0.872	0.906	0.932	0.953	0.970	0.986	1.000	0.929
1.000	0.509	0.630	0.721	0.790	0.842	0.882	0.913	0.939	0.961	0.981	1.000	0.915
1.200	0.467	0.590	0.684	0.757	0.814	0.859	0.895	0.926	0.953	0.977	1.000	0.902
1.500	0.413	0.537	0.635	0.713	0.776	0.827	0.870	0.907	0.940	0.971	1.000	0.883
2.000	0.336	0.462	0.565	0.650	0.720	0.781	0.833	0.879	0.922	0.961	1.000	0.855
2.500	0.274	0.401	0.507	0.597	0.674	0.741	0.801	0.855	0.905	0.953	1.000	0.832
3.000	0.222	0.349	0.458	0.552	0.634	0.707	0.773	0.834	0.891	0.946	1.000	0.810
3.500	0.177	0.305	0.416	0.513	0.599	0.677	0.749	0.815	0.879	0.940	1.000	0.791
4.000	0.138	0.267	0.379	0.479	0.569	0.651	0.727	0.799	0.868	0.934	1.000	0.773
5.000	0.076	0.205	0.320	0.423	0.519	0.608	0.692	0.772	0.849	0.925	1.000	0.742
6.000	0.029	0.158	0.273	0.380	0.479	0.574	0.663	0.750	0.835	0.918	1.000	0.715

SLIP COEFF(B)= 0.0   INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.046	-0.021	-0.009	-0.004	-0.001	-0.001	-0.000	-0.000	0.0	0.0
0.040	-0.100	-0.053	-0.027	-0.014	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.060	-0.100	-0.057	-0.032	-0.018	-0.011	-0.006	-0.003	-0.002	-0.001	-0.001	-0.000
0.100	-0.100	-0.064	-0.040	-0.025	-0.016	-0.010	-0.006	-0.004	-0.003	-0.002	-0.002
0.150	-0.100	-0.069	-0.046	-0.031	-0.021	-0.014	-0.010	-0.007	-0.005	-0.004	-0.004
0.200	-0.100	-0.072	-0.051	-0.036	-0.025	-0.018	-0.013	-0.010	-0.008	-0.007	-0.006
0.250	-0.100	-0.074	-0.054	-0.039	-0.029	-0.021	-0.016	-0.012	-0.010	-0.009	-0.008
0.300	-0.100	-0.076	-0.057	-0.043	-0.032	-0.024	-0.019	-0.015	-0.012	-0.011	-0.010
0.400	-0.100	-0.079	-0.061	-0.047	-0.037	-0.029	-0.023	-0.019	-0.016	-0.015	-0.014
0.500	-0.100	-0.081	-0.064	-0.051	-0.041	-0.033	-0.027	-0.023	-0.020	-0.019	-0.018
0.600	-0.100	-0.082	-0.067	-0.054	-0.044	-0.037	-0.031	-0.026	-0.023	-0.022	-0.021
0.800	-0.100	-0.084	-0.070	-0.059	-0.050	-0.042	-0.036	-0.032	-0.029	-0.028	-0.027
1.000	-0.100	-0.085	-0.073	-0.062	-0.054	-0.047	-0.041	-0.037	-0.034	-0.032	-0.032
1.200	-0.100	-0.086	-0.075	-0.065	-0.057	-0.050	-0.045	-0.041	-0.038	-0.037	-0.036
1.500	-0.100	-0.088	-0.077	-0.068	-0.061	-0.055	-0.050	-0.046	-0.044	-0.042	-0.042
2.000	-0.100	-0.089	-0.080	-0.072	-0.066	-0.060	-0.056	-0.053	-0.051	-0.049	-0.049
2.500	-0.100	-0.090	-0.082	-0.075	-0.069	-0.065	-0.061	-0.058	-0.056	-0.055	-0.054
3.000	-0.100	-0.091	-0.084	-0.077	-0.072	-0.068	-0.065	-0.062	-0.060	-0.059	-0.059
3.500	-0.100	-0.091	-0.085	-0.079	-0.075	-0.071	-0.068	-0.066	-0.064	-0.063	-0.063
4.000	-0.100	-0.092	-0.086	-0.081	-0.077	-0.073	-0.071	-0.068	-0.067	-0.066	-0.066
5.000	-0.100	-0.092	-0.087	-0.083	-0.080	-0.077	-0.075	-0.073	-0.072	-0.071	-0.071
6.000	-0.100	-0.092	-0.088	-0.085	-0.082	-0.080	-0.078	-0.076	-0.076	-0.075	-0.075

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.296	0.313	0.326	0.346

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.875	0.967	0.991	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.995
0.040	0.852	0.953	0.983	0.994	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.993
0.060	0.832	0.939	0.976	0.990	0.995	0.998	0.999	0.999	1.000	1.000	1.000	0.991
0.100	0.797	0.914	0.962	0.981	0.990	0.995	0.997	0.998	0.999	1.000	1.000	0.987
0.150	0.762	0.886	0.943	0.970	0.983	0.990	0.994	0.996	0.998	0.999	1.000	0.982
0.200	0.731	0.861	0.926	0.958	0.975	0.985	0.991	0.994	0.997	0.998	1.000	0.977
0.250	0.704	0.837	0.908	0.946	0.967	0.979	0.987	0.992	0.995	0.998	1.000	0.973
0.300	0.679	0.815	0.892	0.934	0.959	0.974	0.983	0.989	0.993	0.997	1.000	0.968
0.400	0.635	0.776	0.860	0.911	0.942	0.961	0.974	0.983	0.990	0.995	1.000	0.959
0.500	0.597	0.740	0.831	0.883	0.925	0.949	0.965	0.977	0.986	0.993	1.000	0.951
0.600	0.562	0.708	0.804	0.866	0.908	0.936	0.956	0.970	0.982	0.991	1.000	0.942
0.800	0.502	0.651	0.754	0.825	0.875	0.910	0.936	0.957	0.973	0.987	1.000	0.926
1.000	0.450	0.601	0.710	0.787	0.844	0.886	0.918	0.943	0.964	0.983	1.000	0.911
1.200	0.404	0.557	0.669	0.752	0.815	0.862	0.899	0.930	0.955	0.978	1.000	0.897
1.500	0.343	0.498	0.616	0.705	0.774	0.829	0.874	0.911	0.943	0.972	1.000	0.877
2.000	0.259	0.416	0.539	0.636	0.715	0.780	0.834	0.881	0.923	0.962	1.000	0.847
2.500	0.190	0.348	0.475	0.578	0.664	0.737	0.800	0.855	0.906	0.954	1.000	0.819
3.000	0.133	0.292	0.421	0.528	0.620	0.699	0.769	0.832	0.891	0.946	1.000	0.794
3.500	0.085	0.243	0.374	0.485	0.581	0.666	0.742	0.812	0.877	0.939	1.000	0.771
4.000	0.045	0.203	0.334	0.448	0.547	0.637	0.718	0.793	0.864	0.933	1.000	0.753

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.047	-0.022	-0.010	-0.004	-0.002	-0.001	-0.000	-0.000	0.0	0.0
0.040	-0.100	-0.052	-0.027	-0.014	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.060	-0.100	-0.056	-0.031	-0.017	-0.010	-0.006	-0.003	-0.002	-0.001	-0.001	-0.000
0.100	-0.100	-0.061	-0.037	-0.023	-0.014	-0.009	-0.006	-0.004	-0.003	-0.002	-0.002
0.150	-0.100	-0.066	-0.043	-0.028	-0.019	-0.013	-0.009	-0.006	-0.005	-0.004	-0.003
0.200	-0.100	-0.069	-0.047	-0.032	-0.022	-0.016	-0.011	-0.009	-0.007	-0.006	-0.005
0.250	-0.100	-0.072	-0.051	-0.036	-0.026	-0.019	-0.014	-0.011	-0.009	-0.007	-0.007
0.300	-0.100	-0.073	-0.053	-0.039	-0.028	-0.021	-0.016	-0.013	-0.010	-0.009	-0.009
0.400	-0.100	-0.076	-0.058	-0.044	-0.033	-0.026	-0.020	-0.016	-0.014	-0.013	-0.012
0.500	-0.100	-0.078	-0.061	-0.047	-0.037	-0.029	-0.024	-0.020	-0.017	-0.016	-0.015
0.600	-0.100	-0.080	-0.063	-0.050	-0.040	-0.032	-0.027	-0.023	-0.020	-0.018	-0.018
0.800	-0.100	-0.082	-0.067	-0.055	-0.045	-0.038	-0.032	-0.028	-0.025	-0.023	-0.023
1.000	-0.100	-0.083	-0.070	-0.058	-0.049	-0.042	-0.036	-0.032	-0.029	-0.028	-0.027
1.200	-0.100	-0.084	-0.072	-0.061	-0.052	-0.045	-0.040	-0.036	-0.033	-0.031	-0.031
1.500	-0.100	-0.086	-0.074	-0.064	-0.056	-0.049	-0.044	-0.040	-0.038	-0.036	-0.036
2.000	-0.100	-0.087	-0.076	-0.068	-0.061	-0.055	-0.050	-0.047	-0.044	-0.043	-0.042
2.500	-0.100	-0.088	-0.078	-0.071	-0.064	-0.059	-0.055	-0.052	-0.049	-0.048	-0.048
3.000	-0.100	-0.088	-0.080	-0.073	-0.067	-0.062	-0.058	-0.056	-0.054	-0.052	-0.052
3.500	-0.100	-0.088	-0.081	-0.074	-0.069	-0.065	-0.061	-0.059	-0.057	-0.056	-0.056
4.000	-0.100	-0.088	-0.081	-0.075	-0.071	-0.067	-0.064	-0.062	-0.060	-0.059	-0.059

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.395	0.416	0.433	0.461

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.849	0.960	0.989	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.994
0.040	0.825	0.946	0.982	0.993	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.992
0.060	0.805	0.933	0.975	0.989	0.995	0.998	0.999	0.999	1.000	1.000	1.000	0.990
0.100	0.769	0.908	0.960	0.981	0.990	0.995	0.997	0.998	0.999	1.000	1.000	0.986
0.150	0.732	0.879	0.942	0.970	0.984	0.991	0.994	0.997	0.998	0.999	1.000	0.981
0.200	0.699	0.852	0.925	0.959	0.976	0.986	0.991	0.995	0.997	0.999	1.000	0.976
0.250	0.670	0.828	0.907	0.947	0.969	0.981	0.988	0.992	0.995	0.998	1.000	0.972
0.300	0.644	0.805	0.890	0.936	0.961	0.975	0.984	0.990	0.994	0.997	1.000	0.967
0.400	0.596	0.763	0.858	0.913	0.944	0.964	0.976	0.984	0.991	0.996	1.000	0.959
0.500	0.555	0.726	0.828	0.890	0.928	0.951	0.967	0.979	0.987	0.994	1.000	0.949
0.600	0.518	0.692	0.800	0.868	0.911	0.939	0.958	0.972	0.983	0.992	1.000	0.941
0.800	0.453	0.631	0.748	0.826	0.878	0.914	0.940	0.959	0.975	0.988	1.000	0.924
1.000	0.397	0.578	0.702	0.787	0.847	0.890	0.922	0.946	0.966	0.984	1.000	0.909
1.200	0.348	0.531	0.659	0.751	0.817	0.866	0.904	0.933	0.958	0.980	1.000	0.894
1.500	0.283	0.468	0.602	0.701	0.776	0.833	0.877	0.914	0.945	0.974	1.000	0.872
2.000	0.194	0.381	0.521	0.629	0.714	0.781	0.837	0.884	0.926	0.964	1.000	0.840
2.500	0.122	0.309	0.453	0.567	0.660	0.736	0.801	0.857	0.908	0.955	1.000	0.816
3.000	0.064	0.250	0.396	0.515	0.613	0.697	0.769	0.833	0.892	0.947	1.000	0.782
3.500	0.019	0.202	0.348	0.469	0.572	0.662	0.740	0.811	0.877	0.939	1.000	0.757

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.047	-0.022	-0.010	-0.004	-0.002	-0.001	-0.000	-0.000	0.0	0.0
0.040	-0.100	-0.051	-0.026	-0.014	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.060	-0.100	-0.054	-0.030	-0.017	-0.009	-0.005	-0.003	-0.002	-0.001	-0.001	-0.000
0.100	-0.100	-0.059	-0.035	-0.021	-0.013	-0.008	-0.005	-0.004	-0.002	-0.002	-0.002
0.150	-0.100	-0.064	-0.041	-0.026	-0.017	-0.012	-0.008	-0.006	-0.004	-0.003	-0.003
0.200	-0.100	-0.067	-0.045	-0.030	-0.021	-0.014	-0.010	-0.008	-0.006	-0.005	-0.005
0.250	-0.100	-0.069	-0.048	-0.033	-0.023	-0.017	-0.012	-0.009	-0.008	-0.007	-0.006
0.300	-0.100	-0.071	-0.050	-0.036	-0.026	-0.019	-0.014	-0.011	-0.009	-0.008	-0.008
0.400	-0.100	-0.074	-0.055	-0.040	-0.030	-0.023	-0.018	-0.015	-0.012	-0.011	-0.011
0.500	-0.100	-0.076	-0.058	-0.044	-0.034	-0.026	-0.021	-0.017	-0.015	-0.014	-0.013
0.600	-0.100	-0.078	-0.060	-0.047	-0.037	-0.029	-0.024	-0.020	-0.017	-0.016	-0.016
0.800	-0.100	-0.080	-0.064	-0.051	-0.042	-0.034	-0.029	-0.025	-0.022	-0.020	-0.020
1.000	-0.100	-0.081	-0.067	-0.055	-0.045	-0.038	-0.033	-0.029	-0.026	-0.024	-0.024
1.200	-0.100	-0.082	-0.069	-0.057	-0.048	-0.041	-0.036	-0.032	-0.029	-0.028	-0.027
1.500	-0.100	-0.084	-0.071	-0.060	-0.052	-0.045	-0.040	-0.036	-0.034	-0.032	-0.032
2.000	-0.100	-0.085	-0.073	-0.064	-0.057	-0.050	-0.046	-0.042	-0.040	-0.038	-0.038
2.500	-0.100	-0.085	-0.075	-0.067	-0.060	-0.054	-0.050	-0.047	-0.044	-0.043	-0.043
3.000	-0.100	-0.085	-0.076	-0.069	-0.062	-0.057	-0.053	-0.050	-0.048	-0.047	-0.047
3.500	-0.100	-0.085	-0.077	-0.070	-0.064	-0.060	-0.056	-0.054	-0.052	-0.051	-0.050

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.495	0.518	0.540	0.560

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 0.0

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.982	0.993	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999
0.040	0.964	0.979	0.989	0.994	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.997
0.060	0.955	0.969	0.980	0.988	0.993	0.996	0.998	0.999	1.000	1.000	1.000	0.995
0.100	0.938	0.954	0.966	0.976	0.984	0.989	0.993	0.996	0.998	0.999	1.000	0.991
0.150	0.924	0.939	0.952	0.963	0.973	0.980	0.986	0.990	0.994	0.997	1.000	0.987
0.200	0.911	0.927	0.941	0.953	0.963	0.972	0.979	0.985	0.991	0.995	1.000	0.983
0.250	0.901	0.917	0.931	0.943	0.954	0.964	0.973	0.980	0.987	0.994	1.000	0.979
0.300	0.892	0.908	0.922	0.935	0.947	0.958	0.968	0.976	0.985	0.992	1.000	0.977
0.400	0.878	0.894	0.909	0.923	0.936	0.948	0.959	0.970	0.980	0.990	1.000	0.972
0.500	0.867	0.883	0.898	0.913	0.927	0.940	0.953	0.965	0.977	0.988	1.000	0.968
0.600	0.859	0.875	0.891	0.906	0.920	0.934	0.948	0.961	0.974	0.987	1.000	0.966
0.800	0.848	0.865	0.881	0.896	0.912	0.927	0.942	0.956	0.971	0.986	1.000	0.962
1.000	0.843	0.859	0.875	0.891	0.907	0.923	0.938	0.954	0.969	0.985	1.000	0.960
1.200	0.839	0.855	0.872	0.888	0.904	0.920	0.936	0.952	0.968	0.984	1.000	0.959
1.500	0.837	0.853	0.869	0.886	0.902	0.918	0.935	0.951	0.967	0.984	1.000	0.958
2.000	0.835	0.852	0.868	0.884	0.901	0.917	0.934	0.950	0.967	0.983	1.000	0.957
2.500	0.835	0.851	0.868	0.884	0.901	0.917	0.934	0.950	0.967	0.983	1.000	0.957
3.000	0.835	0.851	0.868	0.884	0.901	0.917	0.934	0.950	0.967	0.983	1.000	0.957
3.500	0.835	0.851	0.868	0.884	0.901	0.917	0.934	0.950	0.967	0.983	1.000	0.957
4.000	0.835	0.851	0.868	0.884	0.901	0.917	0.934	0.950	0.967	0.983	1.000	0.957
5.000	0.835	0.851	0.868	0.884	0.901	0.917	0.934	0.950	0.967	0.983	1.000	0.957
6.000	0.835	0.851	0.868	0.884	0.901	0.917	0.934	0.950	0.967	0.983	1.000	0.957
8.000	0.835	0.851	0.868	0.884	0.901	0.917	0.934	0.950	0.967	0.983	1.000	0.957
10.000	0.835	0.851	0.868	0.884	0.901	0.917	0.934	0.950	0.967	0.983	1.000	0.957

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 0.0

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.039	-0.016	-0.006	-0.003	-0.001	-0.000	-0.000	-0.000	0.0	0.0
0.040	-0.100	-0.076	-0.045	-0.024	-0.012	-0.006	-0.003	-0.001	-0.001	-0.000	-0.000
0.060	-0.100	-0.075	-0.057	-0.039	-0.024	-0.014	-0.008	-0.004	-0.002	-0.001	-0.001
0.100	-0.100	-0.084	-0.066	-0.052	-0.039	-0.028	-0.020	-0.013	-0.009	-0.007	-0.006
0.150	-0.100	-0.085	-0.074	-0.061	-0.049	-0.039	-0.031	-0.025	-0.020	-0.017	-0.016
0.200	-0.100	-0.089	-0.076	-0.066	-0.057	-0.048	-0.041	-0.035	-0.031	-0.028	-0.027
0.250	-0.100	-0.090	-0.081	-0.071	-0.062	-0.055	-0.049	-0.044	-0.040	-0.038	-0.037
0.300	-0.100	-0.091	-0.082	-0.075	-0.068	-0.061	-0.056	-0.051	-0.048	-0.046	-0.045
0.400	-0.100	-0.093	-0.088	-0.081	-0.076	-0.071	-0.067	-0.063	-0.061	-0.059	-0.058
0.500	-0.100	-0.095	-0.090	-0.086	-0.082	-0.078	-0.075	-0.072	-0.071	-0.069	-0.069
0.600	-0.100	-0.096	-0.093	-0.089	-0.086	-0.083	-0.081	-0.079	-0.078	-0.077	-0.077
0.800	-0.100	-0.098	-0.096	-0.094	-0.092	-0.091	-0.089	-0.088	-0.088	-0.087	-0.087
1.000	-0.100	-0.099	-0.098	-0.097	-0.096	-0.095	-0.094	-0.093	-0.093	-0.093	-0.092
1.200	-0.100	-0.099	-0.098	-0.098	-0.098	-0.097	-0.097	-0.096	-0.096	-0.096	-0.096
1.500	-0.100	-0.100	-0.100	-0.099	-0.099	-0.099	-0.099	-0.098	-0.098	-0.098	-0.098
2.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.099
2.500	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
3.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
3.500	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
4.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
5.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
6.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
8.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
10.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.005	0.019	0.035	0.094

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.954	0.985	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.998
0.040	0.932	0.971	0.987	0.994	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.996
0.060	0.918	0.959	0.979	0.989	0.994	0.997	0.998	0.999	1.000	1.000	1.000	0.994
0.100	0.893	0.938	0.964	0.979	0.987	0.992	0.995	0.997	0.998	0.999	1.000	0.990
0.150	0.870	0.916	0.946	0.965	0.977	0.985	0.990	0.994	0.996	0.998	1.000	0.985
0.200	0.850	0.898	0.930	0.953	0.968	0.978	0.985	0.990	0.994	0.997	1.000	0.981
0.250	0.833	0.881	0.916	0.941	0.958	0.970	0.979	0.986	0.991	0.996	1.000	0.976
0.300	0.818	0.866	0.903	0.929	0.949	0.963	0.974	0.982	0.988	0.995	1.000	0.972
0.400	0.790	0.840	0.879	0.908	0.931	0.949	0.963	0.974	0.984	0.992	1.000	0.965
0.500	0.767	0.817	0.858	0.890	0.915	0.936	0.952	0.966	0.979	0.990	1.000	0.959
0.600	0.746	0.797	0.839	0.873	0.900	0.923	0.943	0.959	0.974	0.987	1.000	0.952
0.800	0.710	0.762	0.806	0.843	0.874	0.901	0.925	0.946	0.965	0.983	1.000	0.943
1.000	0.681	0.733	0.778	0.818	0.852	0.882	0.910	0.934	0.957	0.979	1.000	0.931
1.200	0.655	0.708	0.755	0.796	0.833	0.866	0.896	0.924	0.950	0.975	1.000	0.922
1.500	0.624	0.677	0.725	0.769	0.808	0.845	0.879	0.911	0.941	0.971	1.000	0.911
2.000	0.583	0.636	0.686	0.733	0.776	0.817	0.856	0.894	0.930	0.965	1.000	0.897
2.500	0.552	0.606	0.658	0.706	0.752	0.797	0.839	0.880	0.921	0.961	1.000	0.886
3.000	0.529	0.584	0.636	0.686	0.734	0.781	0.826	0.870	0.914	0.957	1.000	0.877
3.500	0.511	0.566	0.619	0.670	0.720	0.768	0.816	0.862	0.909	0.954	1.000	0.870
4.000	0.497	0.552	0.605	0.657	0.708	0.758	0.808	0.856	0.904	0.952	1.000	0.865
5.000	0.477	0.532	0.586	0.639	0.692	0.744	0.796	0.847	0.898	0.949	1.000	0.857
6.000	0.464	0.519	0.574	0.628	0.682	0.735	0.789	0.842	0.894	0.947	1.000	0.852
8.000	0.449	0.505	0.560	0.615	0.670	0.725	0.780	0.835	0.890	0.945	1.000	0.846
10.000	0.443	0.499	0.554	0.610	0.665	0.721	0.777	0.832	0.888	0.944	1.000	0.844

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.047	-0.022	-0.009	-0.004	-0.002	-0.001	-0.000	-0.000	0.0	0.0
0.040	-0.100	-0.060	-0.034	-0.019	-0.010	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.060	-0.100	-0.067	-0.042	-0.026	-0.016	-0.010	-0.006	-0.003	-0.002	-0.001	-0.001
0.100	-0.100	-0.073	-0.052	-0.036	-0.025	-0.017	-0.011	-0.008	-0.005	-0.004	-0.004
0.150	-0.100	-0.078	-0.059	-0.044	-0.033	-0.024	-0.018	-0.013	-0.010	-0.009	-0.008
0.200	-0.100	-0.081	-0.064	-0.050	-0.038	-0.030	-0.023	-0.018	-0.015	-0.013	-0.013
0.250	-0.100	-0.083	-0.067	-0.054	-0.043	-0.034	-0.028	-0.023	-0.020	-0.018	-0.017
0.300	-0.100	-0.084	-0.070	-0.057	-0.047	-0.038	-0.032	-0.027	-0.024	-0.022	-0.021
0.400	-0.100	-0.086	-0.074	-0.062	-0.053	-0.045	-0.039	-0.034	-0.031	-0.029	-0.028
0.500	-0.100	-0.088	-0.076	-0.066	-0.058	-0.050	-0.044	-0.040	-0.037	-0.035	-0.034
0.600	-0.100	-0.089	-0.079	-0.069	-0.061	-0.054	-0.049	-0.045	-0.042	-0.040	-0.039
0.800	-0.100	-0.091	-0.082	-0.074	-0.067	-0.061	-0.056	-0.053	-0.050	-0.048	-0.048
1.000	-0.100	-0.092	-0.084	-0.078	-0.072	-0.066	-0.062	-0.059	-0.057	-0.055	-0.055
1.200	-0.100	-0.093	-0.086	-0.080	-0.075	-0.071	-0.067	-0.064	-0.062	-0.061	-0.060
1.500	-0.100	-0.094	-0.089	-0.084	-0.079	-0.075	-0.072	-0.070	-0.068	-0.067	-0.067
2.000	-0.100	-0.096	-0.091	-0.088	-0.084	-0.081	-0.079	-0.077	-0.076	-0.075	-0.075
2.500	-0.100	-0.097	-0.093	-0.090	-0.088	-0.086	-0.084	-0.082	-0.081	-0.081	-0.081
3.000	-0.100	-0.097	-0.095	-0.092	-0.090	-0.089	-0.087	-0.086	-0.085	-0.085	-0.085
3.500	-0.100	-0.098	-0.096	-0.094	-0.092	-0.091	-0.090	-0.089	-0.088	-0.088	-0.088
4.000	-0.100	-0.098	-0.097	-0.095	-0.094	-0.093	-0.092	-0.091	-0.091	-0.090	-0.090
5.000	-0.100	-0.099	-0.098	-0.097	-0.096	-0.095	-0.095	-0.094	-0.094	-0.094	-0.094
6.000	-0.100	-0.099	-0.099	-0.098	-0.097	-0.097	-0.097	-0.096	-0.096	-0.096	-0.096
8.000	-0.100	-0.100	-0.099	-0.099	-0.099	-0.099	-0.099	-0.098	-0.098	-0.098	-0.098
10.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.120	0.125	0.125	0.116

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.924	0.977	0.992	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.997
0.040	0.903	0.963	0.985	0.993	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.995
0.060	0.886	0.950	0.977	0.989	0.994	0.997	0.998	0.999	1.000	1.000	1.000	0.993
0.100	0.857	0.927	0.962	0.979	0.988	0.993	0.996	0.998	0.999	0.999	1.000	0.989
0.150	0.829	0.903	0.944	0.967	0.980	0.987	0.992	0.995	0.997	0.999	1.000	0.984
0.200	0.805	0.881	0.927	0.954	0.971	0.981	0.988	0.992	0.995	0.998	1.000	0.979
0.250	0.784	0.861	0.911	0.942	0.962	0.974	0.983	0.989	0.993	0.997	1.000	0.975
0.300	0.764	0.844	0.896	0.930	0.952	0.967	0.978	0.985	0.991	0.996	1.000	0.970
0.400	0.730	0.812	0.868	0.907	0.934	0.953	0.967	0.978	0.986	0.993	1.000	0.962
0.500	0.701	0.783	0.843	0.886	0.917	0.940	0.957	0.971	0.982	0.991	1.000	0.954
0.600	0.674	0.758	0.820	0.866	0.901	0.927	0.947	0.963	0.977	0.989	1.000	0.947
0.800	0.628	0.713	0.779	0.830	0.870	0.902	0.928	0.949	0.967	0.984	1.000	0.932
1.000	0.588	0.674	0.743	0.798	0.843	0.879	0.910	0.936	0.959	0.980	1.000	0.921
1.200	0.554	0.640	0.711	0.770	0.818	0.858	0.893	0.923	0.950	0.976	1.000	0.910
1.500	0.509	0.596	0.670	0.732	0.785	0.830	0.870	0.906	0.939	0.970	1.000	0.894
2.000	0.447	0.535	0.612	0.679	0.738	0.791	0.838	0.882	0.923	0.962	1.000	0.872
2.500	0.397	0.486	0.566	0.636	0.700	0.758	0.811	0.861	0.909	0.955	1.000	0.853
3.000	0.356	0.446	0.527	0.601	0.668	0.731	0.789	0.844	0.897	0.949	1.000	0.837
3.500	0.322	0.412	0.494	0.571	0.641	0.707	0.770	0.830	0.887	0.944	1.000	0.823
4.000	0.292	0.383	0.467	0.545	0.618	0.687	0.753	0.817	0.879	0.940	1.000	0.811
5.000	0.245	0.336	0.422	0.503	0.581	0.655	0.727	0.797	0.865	0.933	1.000	0.790
6.000	0.209	0.301	0.388	0.471	0.552	0.630	0.706	0.781	0.855	0.927	1.000	0.774
8.000	0.158	0.250	0.340	0.427	0.512	0.595	0.677	0.759	0.839	0.920	1.000	0.750
10.000	0.126	0.218	0.308	0.398	0.486	0.573	0.659	0.745	0.830	0.915	1.000	0.733

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.049	-0.024	-0.011	-0.005	-0.002	-0.001	-0.000	-0.000	0.0	0.0
0.040	-0.100	-0.057	-0.031	-0.017	-0.010	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.060	-0.100	-0.062	-0.037	-0.022	-0.013	-0.008	-0.005	-0.003	-0.002	-0.001	-0.001
0.100	-0.100	-0.068	-0.045	-0.030	-0.020	-0.013	-0.009	-0.006	-0.004	-0.003	-0.003
0.150	-0.100	-0.073	-0.052	-0.037	-0.026	-0.019	-0.013	-0.010	-0.008	-0.006	-0.006
0.200	-0.100	-0.076	-0.057	-0.042	-0.031	-0.023	-0.017	-0.014	-0.011	-0.010	-0.009
0.250	-0.100	-0.078	-0.060	-0.046	-0.035	-0.027	-0.021	-0.017	-0.014	-0.013	-0.012
0.300	-0.100	-0.080	-0.063	-0.049	-0.038	-0.030	-0.024	-0.020	-0.017	-0.015	-0.015
0.400	-0.100	-0.082	-0.067	-0.054	-0.044	-0.036	-0.030	-0.025	-0.022	-0.020	-0.020
0.500	-0.100	-0.084	-0.070	-0.058	-0.048	-0.040	-0.034	-0.030	-0.027	-0.025	-0.024
0.600	-0.100	-0.085	-0.072	-0.061	-0.052	-0.044	-0.038	-0.034	-0.031	-0.029	-0.028
0.800	-0.100	-0.087	-0.076	-0.066	-0.057	-0.050	-0.045	-0.040	-0.037	-0.036	-0.035
1.000	-0.100	-0.088	-0.078	-0.069	-0.061	-0.055	-0.050	-0.046	-0.043	-0.041	-0.041
1.200	-0.100	-0.089	-0.080	-0.072	-0.065	-0.059	-0.054	-0.050	-0.048	-0.046	-0.046
1.500	-0.100	-0.091	-0.082	-0.075	-0.069	-0.063	-0.059	-0.056	-0.053	-0.052	-0.052
2.000	-0.100	-0.092	-0.085	-0.079	-0.074	-0.069	-0.066	-0.063	-0.061	-0.060	-0.059
2.500	-0.100	-0.093	-0.087	-0.082	-0.078	-0.074	-0.071	-0.068	-0.067	-0.066	-0.065
3.000	-0.100	-0.094	-0.089	-0.084	-0.080	-0.077	-0.075	-0.073	-0.071	-0.070	-0.070
3.500	-0.100	-0.095	-0.090	-0.086	-0.083	-0.080	-0.078	-0.076	-0.075	-0.074	-0.074
4.000	-0.100	-0.095	-0.091	-0.088	-0.085	-0.082	-0.080	-0.079	-0.078	-0.077	-0.077
5.000	-0.100	-0.096	-0.093	-0.090	-0.088	-0.086	-0.084	-0.083	-0.082	-0.082	-0.082
6.000	-0.100	-0.097	-0.094	-0.092	-0.090	-0.089	-0.087	-0.087	-0.086	-0.086	-0.085
8.000	-0.100	-0.098	-0.096	-0.095	-0.093	-0.092	-0.092	-0.091	-0.091	-0.090	-0.090
10.000	-0.100	-0.098	-0.097	-0.096	-0.095	-0.095	-0.094	-0.094	-0.093	-0.093	-0.093

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.238	0.253	0.261	0.271

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (P4)
0.020	0.895	0.968	0.990	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.995
0.040	0.873	0.955	0.983	0.993	0.997	0.998	0.999	1.000	1.000	1.000	1.000	0.993
0.060	0.855	0.942	0.975	0.989	0.994	0.997	0.998	0.999	1.000	1.000	1.000	0.992
0.100	0.824	0.918	0.960	0.980	0.989	0.994	0.996	0.998	0.999	0.999	1.000	0.989
0.150	0.793	0.892	0.942	0.968	0.981	0.988	0.993	0.996	0.997	0.999	1.000	0.983
0.200	0.765	0.868	0.925	0.955	0.973	0.983	0.989	0.993	0.996	0.998	1.000	0.978
0.250	0.741	0.847	0.908	0.943	0.964	0.977	0.985	0.990	0.994	0.997	1.000	0.973
0.300	0.719	0.827	0.892	0.931	0.955	0.970	0.980	0.987	0.992	0.996	1.000	0.967
0.400	0.681	0.791	0.862	0.908	0.938	0.957	0.971	0.981	0.988	0.994	1.000	0.963
0.500	0.647	0.759	0.835	0.886	0.920	0.944	0.961	0.974	0.984	0.992	1.000	0.952
0.600	0.616	0.730	0.810	0.865	0.903	0.931	0.951	0.967	0.979	0.990	1.000	0.944
0.800	0.562	0.679	0.764	0.826	0.871	0.905	0.932	0.953	0.970	0.986	1.000	0.929
1.000	0.516	0.634	0.723	0.790	0.842	0.881	0.913	0.939	0.961	0.981	1.000	0.915
1.200	0.476	0.595	0.687	0.758	0.814	0.859	0.895	0.926	0.953	0.977	1.000	0.902
1.500	0.422	0.543	0.638	0.715	0.777	0.828	0.870	0.907	0.940	0.971	1.000	0.884
2.000	0.348	0.470	0.570	0.653	0.722	0.782	0.834	0.880	0.922	0.962	1.000	0.859
2.500	0.287	0.410	0.513	0.601	0.677	0.743	0.802	0.856	0.906	0.954	1.000	0.834
3.000	0.236	0.359	0.465	0.557	0.637	0.709	0.775	0.835	0.892	0.946	1.000	0.812
3.500	0.192	0.316	0.424	0.518	0.603	0.680	0.751	0.817	0.880	0.940	1.000	0.794
4.000	0.155	0.279	0.388	0.485	0.573	0.654	0.730	0.801	0.869	0.935	1.000	0.777
5.000	0.094	0.218	0.329	0.430	0.524	0.611	0.694	0.774	0.850	0.926	1.000	0.747
6.000	0.047	0.170	0.283	0.387	0.485	0.577	0.666	0.752	0.836	0.918	1.000	0.721

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.050	-0.025	-0.012	-0.005	-0.002	-0.001	-0.000	-0.000	0.0	0.0
0.040	-0.100	-0.055	-0.030	-0.017	-0.009	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.060	-0.100	-0.059	-0.035	-0.020	-0.012	-0.007	-0.004	-0.003	-0.002	-0.001	-0.001
0.100	-0.100	-0.065	-0.042	-0.027	-0.017	-0.011	-0.008	-0.005	-0.004	-0.003	-0.003
0.150	-0.100	-0.070	-0.048	-0.032	-0.022	-0.016	-0.011	-0.008	-0.006	-0.005	-0.005
0.200	-0.100	-0.073	-0.052	-0.037	-0.027	-0.019	-0.015	-0.011	-0.009	-0.008	-0.007
0.250	-0.100	-0.075	-0.055	-0.041	-0.030	-0.023	-0.017	-0.014	-0.011	-0.010	-0.010
0.300	-0.100	-0.077	-0.058	-0.044	-0.033	-0.026	-0.020	-0.016	-0.014	-0.012	-0.012
0.400	-0.100	-0.079	-0.062	-0.049	-0.038	-0.030	-0.025	-0.021	-0.018	-0.016	-0.016
0.500	-0.100	-0.081	-0.065	-0.052	-0.042	-0.034	-0.029	-0.024	-0.021	-0.020	-0.019
0.600	-0.100	-0.082	-0.068	-0.055	-0.045	-0.038	-0.032	-0.028	-0.025	-0.023	-0.023
0.800	-0.100	-0.084	-0.071	-0.060	-0.051	-0.043	-0.038	-0.033	-0.031	-0.029	-0.028
1.000	-0.100	-0.086	-0.074	-0.063	-0.055	-0.048	-0.042	-0.038	-0.035	-0.034	-0.033
1.200	-0.100	-0.087	-0.076	-0.066	-0.058	-0.051	-0.046	-0.042	-0.039	-0.038	-0.037
1.500	-0.100	-0.088	-0.078	-0.069	-0.062	-0.056	-0.051	-0.047	-0.045	-0.043	-0.043
2.000	-0.100	-0.090	-0.081	-0.073	-0.067	-0.061	-0.057	-0.054	-0.052	-0.050	-0.050
2.500	-0.100	-0.091	-0.083	-0.076	-0.070	-0.066	-0.062	-0.059	-0.057	-0.056	-0.056
3.000	-0.100	-0.091	-0.084	-0.078	-0.073	-0.069	-0.066	-0.063	-0.061	-0.060	-0.060
3.500	-0.100	-0.092	-0.085	-0.080	-0.076	-0.072	-0.069	-0.067	-0.065	-0.064	-0.064
4.000	-0.100	-0.092	-0.086	-0.082	-0.077	-0.074	-0.072	-0.070	-0.068	-0.067	-0.067
5.000	-0.100	-0.093	-0.088	-0.084	-0.081	-0.078	-0.076	-0.074	-0.073	-0.072	-0.072
6.000	-0.100	-0.093	-0.089	-0.086	-0.083	-0.081	-0.079	-0.077	-0.077	-0.076	-0.076

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.358	0.378	0.393	0.424

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.866	0.960	0.988	0.996	0.999	0.999	1.000	1.000	1.000	1.000	1.000	0.994
0.040	0.844	0.947	0.980	0.992	0.997	0.998	0.999	1.000	1.000	1.000	1.000	0.992
0.060	0.825	0.934	0.973	0.988	0.994	0.997	0.998	0.999	1.000	1.000	1.000	0.990
0.100	0.793	0.910	0.959	0.979	0.989	0.994	0.996	0.998	0.999	1.000	1.000	0.986
0.150	0.759	0.882	0.940	0.969	0.982	0.989	0.993	0.996	0.998	0.999	1.000	0.982
0.200	0.729	0.858	0.923	0.956	0.974	0.984	0.990	0.994	0.996	0.998	1.000	0.977
0.250	0.703	0.835	0.906	0.944	0.966	0.978	0.986	0.991	0.995	0.998	1.000	0.972
0.300	0.679	0.813	0.889	0.932	0.957	0.972	0.982	0.988	0.993	0.997	1.000	0.968
0.400	0.636	0.775	0.858	0.909	0.940	0.960	0.973	0.982	0.989	0.995	1.000	0.959
0.500	0.599	0.740	0.830	0.887	0.923	0.947	0.964	0.976	0.985	0.993	1.000	0.952
0.600	0.565	0.709	0.803	0.865	0.906	0.935	0.955	0.969	0.981	0.991	1.000	0.942
0.800	0.506	0.652	0.754	0.824	0.874	0.909	0.936	0.956	0.972	0.987	1.000	0.926
1.000	0.455	0.604	0.710	0.787	0.843	0.885	0.917	0.942	0.964	0.982	1.000	0.911
1.200	0.410	0.560	0.671	0.753	0.814	0.862	0.899	0.929	0.955	0.978	1.000	0.897
1.500	0.351	0.502	0.617	0.706	0.774	0.829	0.873	0.910	0.943	0.972	1.000	0.878
2.000	0.268	0.421	0.542	0.638	0.716	0.780	0.834	0.881	0.923	0.962	1.000	0.849
2.500	0.201	0.355	0.479	0.580	0.665	0.737	0.800	0.855	0.906	0.954	1.000	0.821
3.000	0.144	0.299	0.425	0.531	0.622	0.700	0.770	0.832	0.891	0.946	1.000	0.795
3.500	0.097	0.251	0.379	0.488	0.583	0.667	0.743	0.812	0.877	0.939	1.000	0.774
4.000	0.057	0.210	0.339	0.451	0.550	0.638	0.719	0.794	0.865	0.933	1.000	0.752

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.050	-0.025	-0.012	-0.006	-0.002	-0.001	-0.000	-0.000	-0.000	0.0
0.040	-0.100	-0.054	-0.030	-0.016	-0.009	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.060	-0.100	-0.058	-0.033	-0.019	-0.012	-0.007	-0.004	-0.003	-0.002	-0.001	-0.001
0.100	-0.100	-0.063	-0.039	-0.025	-0.016	-0.010	-0.007	-0.005	-0.003	-0.003	-0.002
0.150	-0.100	-0.067	-0.044	-0.030	-0.020	-0.014	-0.010	-0.007	-0.006	-0.005	-0.004
0.200	-0.100	-0.070	-0.049	-0.034	-0.024	-0.017	-0.013	-0.010	-0.008	-0.007	-0.006
0.250	-0.100	-0.072	-0.052	-0.037	-0.027	-0.020	-0.015	-0.012	-0.010	-0.009	-0.008
0.300	-0.100	-0.074	-0.054	-0.040	-0.030	-0.022	-0.017	-0.014	-0.012	-0.010	-0.010
0.400	-0.100	-0.077	-0.059	-0.045	-0.034	-0.027	-0.021	-0.018	-0.015	-0.014	-0.013
0.500	-0.100	-0.079	-0.062	-0.048	-0.038	-0.030	-0.025	-0.021	-0.018	-0.017	-0.016
0.600	-0.100	-0.080	-0.064	-0.051	-0.041	-0.034	-0.028	-0.024	-0.021	-0.019	-0.019
0.800	-0.100	-0.082	-0.068	-0.056	-0.046	-0.039	-0.033	-0.029	-0.026	-0.024	-0.024
1.000	-0.100	-0.084	-0.070	-0.059	-0.050	-0.043	-0.037	-0.033	-0.030	-0.029	-0.028
1.200	-0.100	-0.085	-0.072	-0.062	-0.053	-0.046	-0.041	-0.037	-0.034	-0.032	-0.032
1.500	-0.100	-0.086	-0.074	-0.065	-0.057	-0.050	-0.045	-0.041	-0.039	-0.037	-0.037
2.000	-0.100	-0.087	-0.077	-0.069	-0.061	-0.056	-0.051	-0.048	-0.045	-0.044	-0.043
2.500	-0.100	-0.088	-0.079	-0.071	-0.065	-0.060	-0.056	-0.053	-0.050	-0.049	-0.049
3.000	-0.100	-0.089	-0.080	-0.073	-0.068	-0.063	-0.059	-0.056	-0.055	-0.053	-0.053
3.500	-0.100	-0.089	-0.081	-0.075	-0.070	-0.066	-0.062	-0.060	-0.058	-0.057	-0.057
4.000	-0.100	-0.089	-0.082	-0.076	-0.072	-0.068	-0.065	-0.062	-0.061	-0.060	-0.060

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.478	0.502	0.524	0.571

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.050	-0.026	-0.013	-0.006	-0.003	-0.001	-0.000	-0.000	-0.000	0.0
0.040	-0.100	-0.054	-0.029	-0.016	-0.009	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.060	-0.100	-0.057	-0.032	-0.019	-0.011	-0.007	-0.004	-0.002	-0.001	-0.001	-0.001
0.100	-0.100	-0.061	-0.037	-0.023	-0.015	-0.010	-0.006	-0.004	-0.003	-0.002	-0.002
0.150	-0.100	-0.065	-0.042	-0.028	-0.019	-0.013	-0.009	-0.007	-0.005	-0.004	-0.004
0.200	-0.100	-0.068	-0.046	-0.031	-0.022	-0.016	-0.011	-0.009	-0.007	-0.006	-0.006
0.250	-0.100	-0.070	-0.049	-0.034	-0.025	-0.018	-0.014	-0.010	-0.009	-0.007	-0.007
0.300	-0.100	-0.072	-0.052	-0.037	-0.027	-0.020	-0.015	-0.012	-0.010	-0.009	-0.009
0.400	-0.100	-0.075	-0.056	-0.041	-0.031	-0.024	-0.019	-0.016	-0.013	-0.012	-0.011
0.500	-0.100	-0.077	-0.059	-0.045	-0.035	-0.027	-0.022	-0.018	-0.016	-0.015	-0.014
0.600	-0.100	-0.078	-0.061	-0.048	-0.038	-0.030	-0.025	-0.021	-0.018	-0.017	-0.016
0.800	-0.100	-0.080	-0.065	-0.052	-0.043	-0.035	-0.030	-0.026	-0.023	-0.021	-0.021
1.000	-0.100	-0.082	-0.067	-0.055	-0.046	-0.039	-0.033	-0.029	-0.027	-0.025	-0.025
1.200	-0.100	-0.083	-0.069	-0.058	-0.049	-0.042	-0.037	-0.033	-0.030	-0.029	-0.028
1.500	-0.100	-0.084	-0.071	-0.061	-0.053	-0.046	-0.041	-0.037	-0.035	-0.033	-0.032
2.000	-0.100	-0.085	-0.074	-0.065	-0.057	-0.051	-0.047	-0.043	-0.040	-0.039	-0.039
2.500	-0.100	-0.086	-0.076	-0.067	-0.061	-0.055	-0.051	-0.048	-0.045	-0.044	-0.044
3.000	-0.100	-0.086	-0.077	-0.069	-0.063	-0.058	-0.054	-0.051	-0.049	-0.048	-0.048
3.500	-0.100	-0.086	-0.077	-0.071	-0.065	-0.061	-0.057	-0.054	-0.052	-0.051	-0.051

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.600	0.627	0.655	0.707

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 0.0

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PD)
0.020	0.984	0.993	0.997	0.999	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.999
0.040	0.966	0.980	0.989	0.994	0.997	0.998	0.999	1.000	1.000	1.000	1.000	0.997
0.060	0.958	0.970	0.980	0.987	0.992	0.996	0.998	0.999	0.999	1.000	1.000	0.995
0.100	0.943	0.956	0.967	0.976	0.983	0.988	0.992	0.995	0.997	0.999	1.000	0.991
0.150	0.930	0.943	0.954	0.964	0.972	0.979	0.985	0.990	0.994	0.997	1.000	0.987
0.200	0.918	0.932	0.944	0.954	0.963	0.971	0.978	0.985	0.990	0.995	1.000	0.983
0.250	0.909	0.922	0.935	0.946	0.956	0.965	0.973	0.980	0.987	0.994	1.000	0.980
0.300	0.901	0.915	0.927	0.939	0.949	0.959	0.968	0.977	0.985	0.992	1.000	0.978
0.400	0.889	0.902	0.915	0.928	0.939	0.950	0.961	0.971	0.981	0.991	1.000	0.974
0.500	0.880	0.894	0.907	0.920	0.932	0.944	0.956	0.967	0.978	0.989	1.000	0.971
0.600	0.874	0.888	0.901	0.915	0.927	0.940	0.952	0.964	0.976	0.988	1.000	0.969
0.800	0.866	0.880	0.894	0.908	0.921	0.934	0.948	0.961	0.974	0.987	1.000	0.966
1.000	0.863	0.876	0.890	0.904	0.918	0.932	0.945	0.959	0.973	0.986	1.000	0.965
1.200	0.861	0.875	0.889	0.903	0.916	0.930	0.944	0.958	0.972	0.986	1.000	0.964
1.500	0.860	0.873	0.887	0.901	0.915	0.929	0.944	0.958	0.972	0.986	1.000	0.964
2.000	0.859	0.873	0.887	0.901	0.915	0.929	0.943	0.957	0.971	0.986	1.000	0.964
2.500	0.859	0.873	0.887	0.901	0.915	0.929	0.943	0.957	0.971	0.986	1.000	0.964
3.000	0.859	0.873	0.887	0.901	0.915	0.929	0.943	0.957	0.971	0.986	1.000	0.964
3.500	0.859	0.873	0.887	0.901	0.915	0.929	0.943	0.957	0.971	0.986	1.000	0.964
4.000	0.859	0.873	0.887	0.901	0.915	0.929	0.943	0.957	0.971	0.986	1.000	0.964
5.000	0.859	0.873	0.887	0.901	0.915	0.929	0.943	0.957	0.971	0.986	1.000	0.964
6.000	0.859	0.873	0.887	0.901	0.915	0.929	0.943	0.957	0.971	0.986	1.000	0.964
8.000	0.859	0.873	0.887	0.901	0.915	0.929	0.943	0.957	0.971	0.986	1.000	0.964
10.000	0.859	0.873	0.887	0.901	0.915	0.929	0.943	0.957	0.971	0.986	1.000	0.964

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 0.0

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.042	-0.018	-0.008	-0.003	-0.001	-0.001	-0.000	-0.000	0.0	0.0
0.040	-0.100	-0.079	-0.049	-0.028	-0.015	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000
0.060	-0.100	-0.077	-0.060	-0.043	-0.028	-0.017	-0.010	-0.006	-0.003	-0.002	-0.002
0.100	-0.100	-0.086	-0.068	-0.055	-0.043	-0.032	-0.024	-0.017	-0.012	-0.010	-0.009
0.150	-0.100	-0.086	-0.076	-0.064	-0.053	-0.044	-0.036	-0.030	-0.025	-0.022	-0.021
0.200	-0.100	-0.090	-0.079	-0.069	-0.061	-0.053	-0.046	-0.041	-0.037	-0.034	-0.034
0.250	-0.100	-0.091	-0.083	-0.074	-0.067	-0.060	-0.055	-0.050	-0.047	-0.045	-0.044
0.300	-0.100	-0.093	-0.085	-0.078	-0.072	-0.066	-0.062	-0.058	-0.055	-0.053	-0.053
0.400	-0.100	-0.094	-0.090	-0.085	-0.080	-0.076	-0.073	-0.070	-0.068	-0.067	-0.066
0.500	-0.100	-0.096	-0.092	-0.089	-0.086	-0.083	-0.080	-0.078	-0.077	-0.076	-0.076
0.600	-0.100	-0.097	-0.095	-0.092	-0.090	-0.088	-0.086	-0.085	-0.084	-0.083	-0.083
0.800	-0.100	-0.099	-0.097	-0.096	-0.095	-0.094	-0.093	-0.092	-0.092	-0.091	-0.091
1.000	-0.100	-0.099	-0.099	-0.098	-0.097	-0.097	-0.096	-0.096	-0.096	-0.096	-0.096
1.200	-0.100	-0.100	-0.099	-0.099	-0.099	-0.098	-0.098	-0.098	-0.098	-0.098	-0.098
1.500	-0.100	-0.100	-0.100	-0.100	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099
2.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
2.500	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
3.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
3.500	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
4.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
5.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
6.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
8.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
10.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.003	0.009	0.017	0.023

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.952	0.983	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.998
0.040	0.933	0.970	0.986	0.993	0.997	0.998	0.999	1.000	1.000	1.000	1.000	0.996
0.060	0.918	0.958	0.978	0.988	0.994	0.996	0.998	0.999	0.999	1.000	1.000	0.994
0.100	0.895	0.938	0.963	0.978	0.986	0.992	0.995	0.997	0.998	0.999	1.000	0.990
0.150	0.873	0.917	0.946	0.965	0.977	0.985	0.990	0.993	0.996	0.998	1.000	0.985
0.200	0.854	0.899	0.931	0.952	0.967	0.977	0.984	0.990	0.994	0.997	1.000	0.981
0.250	0.837	0.883	0.917	0.941	0.958	0.970	0.979	0.986	0.991	0.996	1.000	0.977
0.300	0.822	0.869	0.904	0.930	0.948	0.963	0.973	0.982	0.989	0.994	1.000	0.973
0.400	0.796	0.843	0.880	0.909	0.931	0.949	0.963	0.974	0.983	0.992	1.000	0.965
0.500	0.773	0.821	0.860	0.891	0.916	0.936	0.952	0.966	0.978	0.989	1.000	0.957
0.600	0.753	0.802	0.842	0.875	0.902	0.924	0.943	0.959	0.974	0.987	1.000	0.953
0.800	0.718	0.768	0.810	0.846	0.876	0.903	0.926	0.946	0.965	0.983	1.000	0.942
1.000	0.690	0.740	0.783	0.821	0.855	0.884	0.911	0.935	0.958	0.979	1.000	0.932
1.200	0.666	0.716	0.761	0.801	0.836	0.869	0.898	0.925	0.951	0.976	1.000	0.924
1.500	0.635	0.686	0.732	0.774	0.813	0.848	0.881	0.913	0.943	0.971	1.000	0.914
2.000	0.596	0.648	0.696	0.740	0.782	0.822	0.860	0.896	0.931	0.966	1.000	0.900
2.500	0.568	0.619	0.668	0.715	0.760	0.802	0.844	0.884	0.923	0.962	1.000	0.889
3.000	0.546	0.598	0.648	0.696	0.742	0.787	0.831	0.874	0.916	0.958	1.000	0.881
3.500	0.529	0.581	0.632	0.681	0.729	0.776	0.821	0.867	0.911	0.956	1.000	0.875
4.000	0.516	0.568	0.619	0.669	0.718	0.766	0.814	0.861	0.907	0.954	1.000	0.870
5.000	0.497	0.550	0.602	0.653	0.703	0.753	0.803	0.853	0.902	0.951	1.000	0.863
6.000	0.486	0.538	0.590	0.642	0.694	0.745	0.796	0.847	0.898	0.949	1.000	0.858
8.000	0.473	0.526	0.578	0.631	0.684	0.736	0.789	0.842	0.894	0.947	1.000	0.853
10.000	0.468	0.521	0.573	0.626	0.680	0.733	0.786	0.839	0.893	0.946	1.000	0.851

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.050	-0.025	-0.012	-0.005	-0.002	-0.001	-0.000	-0.000	-0.000	0.0
0.040	-0.100	-0.062	-0.036	-0.021	-0.012	-0.007	-0.004	-0.002	-0.001	-0.001	-0.000
0.060	-0.100	-0.068	-0.044	-0.028	-0.018	-0.011	-0.007	-0.004	-0.003	-0.002	-0.001
0.100	-0.100	-0.074	-0.053	-0.038	-0.026	-0.019	-0.013	-0.009	-0.007	-0.005	-0.005
0.150	-0.100	-0.079	-0.060	-0.046	-0.034	-0.026	-0.020	-0.015	-0.012	-0.010	-0.010
0.200	-0.100	-0.081	-0.065	-0.051	-0.040	-0.032	-0.025	-0.020	-0.017	-0.015	-0.015
0.250	-0.100	-0.083	-0.068	-0.055	-0.045	-0.036	-0.030	-0.025	-0.022	-0.020	-0.019
0.300	-0.100	-0.085	-0.071	-0.059	-0.048	-0.040	-0.034	-0.029	-0.026	-0.024	-0.023
0.400	-0.100	-0.087	-0.074	-0.064	-0.054	-0.047	-0.041	-0.036	-0.033	-0.031	-0.030
0.500	-0.100	-0.088	-0.077	-0.067	-0.059	-0.052	-0.046	-0.042	-0.039	-0.037	-0.036
0.600	-0.100	-0.089	-0.079	-0.070	-0.063	-0.056	-0.051	-0.047	-0.044	-0.042	-0.041
0.800	-0.100	-0.091	-0.083	-0.075	-0.068	-0.063	-0.058	-0.054	-0.052	-0.050	-0.050
1.000	-0.100	-0.092	-0.085	-0.079	-0.073	-0.068	-0.064	-0.061	-0.058	-0.057	-0.057
1.200	-0.100	-0.093	-0.087	-0.081	-0.076	-0.072	-0.068	-0.066	-0.064	-0.062	-0.062
1.500	-0.100	-0.094	-0.089	-0.085	-0.080	-0.077	-0.074	-0.071	-0.070	-0.069	-0.068
2.000	-0.100	-0.096	-0.092	-0.088	-0.085	-0.083	-0.080	-0.079	-0.077	-0.076	-0.076
2.500	-0.100	-0.097	-0.094	-0.091	-0.089	-0.087	-0.085	-0.084	-0.083	-0.082	-0.082
3.000	-0.100	-0.097	-0.095	-0.093	-0.091	-0.090	-0.088	-0.087	-0.086	-0.086	-0.086
3.500	-0.100	-0.098	-0.096	-0.095	-0.093	-0.092	-0.091	-0.090	-0.089	-0.089	-0.089
4.000	-0.100	-0.098	-0.097	-0.096	-0.094	-0.093	-0.093	-0.092	-0.092	-0.091	-0.091
5.000	-0.100	-0.099	-0.098	-0.097	-0.097	-0.096	-0.095	-0.095	-0.095	-0.094	-0.094
6.000	-0.100	-0.099	-0.099	-0.098	-0.098	-0.097	-0.097	-0.097	-0.097	-0.096	-0.096
8.000	-0.100	-0.100	-0.100	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099
10.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.099	-0.099	-0.099	-0.099

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.141	0.147	0.147	0.140

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.920	0.974	0.991	0.997	0.999	0.999	1.000	1.000	1.000	1.000	1.000	0.996
0.040	0.900	0.960	0.983	0.992	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.994
0.060	0.884	0.948	0.976	0.988	0.994	0.997	0.998	0.999	0.999	1.000	1.000	0.992
0.100	0.857	0.926	0.961	0.978	0.987	0.993	0.995	0.997	0.998	0.999	1.000	0.989
0.150	0.830	0.902	0.943	0.966	0.979	0.987	0.991	0.995	0.997	0.999	1.000	0.984
0.200	0.806	0.881	0.926	0.953	0.970	0.980	0.987	0.992	0.995	0.998	1.000	0.979
0.250	0.786	0.862	0.910	0.941	0.961	0.973	0.982	0.988	0.993	0.997	1.000	0.975
0.300	0.767	0.844	0.896	0.929	0.952	0.967	0.977	0.985	0.991	0.996	1.000	0.970
0.400	0.734	0.813	0.868	0.907	0.934	0.953	0.967	0.977	0.985	0.993	1.000	0.962
0.500	0.705	0.785	0.844	0.886	0.917	0.939	0.957	0.970	0.981	0.991	1.000	0.955
0.600	0.679	0.760	0.821	0.867	0.901	0.926	0.947	0.963	0.977	0.989	1.000	0.947
0.800	0.634	0.716	0.781	0.831	0.871	0.902	0.928	0.949	0.967	0.984	1.000	0.934
1.000	0.595	0.678	0.746	0.800	0.844	0.880	0.910	0.936	0.959	0.980	1.000	0.922
1.200	0.561	0.645	0.715	0.772	0.819	0.859	0.893	0.923	0.950	0.976	1.000	0.911
1.500	0.517	0.602	0.674	0.735	0.787	0.832	0.871	0.907	0.939	0.970	1.000	0.896
2.000	0.456	0.543	0.618	0.683	0.741	0.793	0.840	0.883	0.923	0.962	1.000	0.874
2.500	0.403	0.495	0.572	0.641	0.704	0.761	0.813	0.863	0.910	0.955	1.000	0.856
3.000	0.368	0.455	0.534	0.606	0.673	0.734	0.791	0.846	0.898	0.950	1.000	0.840
3.500	0.334	0.422	0.503	0.577	0.646	0.711	0.773	0.832	0.889	0.945	1.000	0.826
4.000	0.306	0.394	0.476	0.552	0.624	0.692	0.757	0.819	0.880	0.940	1.000	0.815
5.000	0.260	0.349	0.432	0.512	0.587	0.660	0.731	0.800	0.867	0.934	1.000	0.795
6.000	0.226	0.314	0.399	0.481	0.560	0.636	0.711	0.784	0.857	0.928	1.000	0.779
8.000	0.177	0.266	0.353	0.437	0.521	0.602	0.683	0.763	0.842	0.921	1.000	0.756
10.000	0.146	0.235	0.323	0.410	0.496	0.581	0.665	0.749	0.833	0.916	1.000	0.741

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.052	-0.027	-0.013	-0.006	-0.003	-0.001	-0.001	-0.000	-0.000	0.0
0.040	-0.100	-0.059	-0.034	-0.019	-0.011	-0.006	-0.004	-0.002	-0.001	-0.001	-0.001
0.060	-0.100	-0.063	-0.039	-0.024	-0.015	-0.009	-0.006	-0.004	-0.002	-0.002	-0.001
0.100	-0.100	-0.069	-0.047	-0.032	-0.021	-0.015	-0.010	-0.007	-0.005	-0.004	-0.004
0.150	-0.100	-0.074	-0.053	-0.038	-0.027	-0.020	-0.015	-0.011	-0.009	-0.008	-0.007
0.200	-0.100	-0.077	-0.058	-0.043	-0.032	-0.024	-0.019	-0.015	-0.012	-0.011	-0.010
0.250	-0.100	-0.079	-0.061	-0.047	-0.036	-0.028	-0.022	-0.018	-0.015	-0.014	-0.013
0.300	-0.100	-0.080	-0.064	-0.050	-0.040	-0.031	-0.026	-0.021	-0.018	-0.017	-0.016
0.400	-0.100	-0.083	-0.068	-0.055	-0.045	-0.037	-0.031	-0.027	-0.024	-0.022	-0.021
0.500	-0.100	-0.084	-0.071	-0.059	-0.049	-0.041	-0.035	-0.031	-0.028	-0.026	-0.026
0.600	-0.100	-0.086	-0.073	-0.062	-0.053	-0.045	-0.039	-0.035	-0.032	-0.030	-0.030
0.800	-0.100	-0.087	-0.076	-0.066	-0.058	-0.051	-0.046	-0.042	-0.039	-0.037	-0.036
1.000	-0.100	-0.089	-0.079	-0.070	-0.062	-0.056	-0.051	-0.047	-0.044	-0.043	-0.042
1.200	-0.100	-0.090	-0.081	-0.072	-0.065	-0.060	-0.055	-0.051	-0.049	-0.047	-0.047
1.500	-0.100	-0.091	-0.083	-0.076	-0.069	-0.064	-0.060	-0.057	-0.055	-0.053	-0.053
2.000	-0.100	-0.092	-0.086	-0.080	-0.074	-0.070	-0.067	-0.064	-0.062	-0.061	-0.060
2.500	-0.100	-0.093	-0.088	-0.083	-0.078	-0.075	-0.072	-0.069	-0.068	-0.067	-0.066
3.000	-0.100	-0.094	-0.089	-0.085	-0.081	-0.078	-0.075	-0.073	-0.072	-0.071	-0.071
3.500	-0.100	-0.095	-0.091	-0.087	-0.083	-0.081	-0.079	-0.077	-0.076	-0.075	-0.075
4.000	-0.100	-0.096	-0.092	-0.088	-0.085	-0.083	-0.081	-0.080	-0.079	-0.078	-0.078
5.000	-0.100	-0.096	-0.093	-0.091	-0.088	-0.087	-0.085	-0.084	-0.083	-0.083	-0.083
6.000	-0.100	-0.097	-0.095	-0.092	-0.091	-0.089	-0.088	-0.087	-0.087	-0.086	-0.086
8.000	-0.100	-0.098	-0.096	-0.095	-0.094	-0.093	-0.092	-0.091	-0.091	-0.091	-0.091
10.000	-0.100	-0.099	-0.097	-0.096	-0.096	-0.095	-0.095	-0.094	-0.094	-0.094	-0.094

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.279	0.295	0.305	0.319

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.889	0.964	0.988	0.996	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.995
0.040	0.868	0.951	0.980	0.992	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.993
0.060	0.851	0.938	0.973	0.987	0.994	0.997	0.998	0.999	0.999	1.000	1.000	0.991
0.100	0.822	0.915	0.958	0.978	0.988	0.993	0.996	0.998	0.999	0.999	1.000	0.987
0.150	0.791	0.890	0.940	0.966	0.980	0.988	0.992	0.995	0.997	0.999	1.000	0.982
0.200	0.765	0.866	0.923	0.954	0.971	0.982	0.988	0.993	0.996	0.998	1.000	0.978
0.250	0.742	0.845	0.906	0.942	0.963	0.976	0.984	0.990	0.994	0.997	1.000	0.973
0.300	0.720	0.826	0.891	0.930	0.954	0.969	0.979	0.987	0.992	0.996	1.000	0.963
0.400	0.682	0.791	0.861	0.907	0.936	0.956	0.970	0.980	0.988	0.994	1.000	0.960
0.500	0.649	0.759	0.834	0.885	0.919	0.943	0.960	0.973	0.983	0.992	1.000	0.952
0.600	0.619	0.731	0.809	0.864	0.903	0.930	0.951	0.966	0.979	0.990	1.000	0.944
0.800	0.566	0.681	0.764	0.826	0.871	0.905	0.931	0.952	0.970	0.985	1.000	0.929
1.000	0.521	0.637	0.724	0.791	0.842	0.881	0.913	0.939	0.961	0.981	1.000	0.916
1.200	0.481	0.598	0.688	0.759	0.814	0.859	0.895	0.926	0.952	0.977	1.000	0.903
1.500	0.428	0.546	0.641	0.716	0.777	0.828	0.871	0.907	0.940	0.971	1.000	0.885
2.000	0.355	0.475	0.573	0.655	0.724	0.783	0.834	0.880	0.922	0.962	1.000	0.859
2.500	0.295	0.416	0.517	0.604	0.679	0.744	0.803	0.856	0.906	0.954	1.000	0.836
3.000	0.245	0.366	0.470	0.560	0.640	0.711	0.776	0.836	0.892	0.947	1.000	0.815
3.500	0.202	0.323	0.429	0.522	0.606	0.682	0.752	0.818	0.880	0.941	1.000	0.796
4.000	0.165	0.287	0.394	0.490	0.577	0.657	0.731	0.802	0.869	0.935	1.000	0.780
5.000	0.105	0.226	0.335	0.435	0.528	0.614	0.697	0.775	0.851	0.926	1.000	0.759
6.000	0.059	0.179	0.290	0.392	0.489	0.581	0.669	0.754	0.837	0.919	1.000	0.725

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.053	-0.028	-0.014	-0.007	-0.003	-0.001	-0.001	-0.000	-0.000	-0.000
0.040	-0.100	-0.057	-0.033	-0.019	-0.011	-0.006	-0.004	-0.002	-0.001	-0.001	-0.001
0.060	-0.100	-0.061	-0.037	-0.022	-0.014	-0.009	-0.005	-0.003	-0.002	-0.002	-0.001
0.100	-0.100	-0.066	-0.043	-0.028	-0.019	-0.013	-0.009	-0.006	-0.005	-0.004	-0.003
0.150	-0.100	-0.071	-0.049	-0.034	-0.024	-0.017	-0.012	-0.009	-0.007	-0.006	-0.006
0.200	-0.100	-0.073	-0.053	-0.038	-0.028	-0.021	-0.016	-0.012	-0.010	-0.009	-0.008
0.250	-0.100	-0.076	-0.056	-0.042	-0.031	-0.024	-0.018	-0.015	-0.012	-0.011	-0.011
0.300	-0.100	-0.077	-0.059	-0.045	-0.034	-0.027	-0.021	-0.017	-0.015	-0.013	-0.013
0.400	-0.100	-0.080	-0.063	-0.049	-0.039	-0.031	-0.026	-0.022	-0.019	-0.017	-0.017
0.500	-0.100	-0.081	-0.066	-0.053	-0.043	-0.035	-0.030	-0.025	-0.023	-0.021	-0.020
0.600	-0.100	-0.083	-0.068	-0.056	-0.046	-0.039	-0.033	-0.029	-0.026	-0.024	-0.024
0.800	-0.100	-0.085	-0.072	-0.061	-0.051	-0.044	-0.039	-0.034	-0.031	-0.030	-0.029
1.000	-0.100	-0.086	-0.074	-0.064	-0.055	-0.049	-0.043	-0.039	-0.036	-0.035	-0.034
1.200	-0.100	-0.087	-0.076	-0.067	-0.059	-0.052	-0.047	-0.043	-0.040	-0.039	-0.038
1.500	-0.100	-0.088	-0.078	-0.070	-0.062	-0.057	-0.052	-0.048	-0.046	-0.044	-0.044
2.000	-0.100	-0.090	-0.081	-0.074	-0.067	-0.062	-0.058	-0.055	-0.053	-0.051	-0.051
2.500	-0.100	-0.091	-0.083	-0.077	-0.071	-0.066	-0.063	-0.060	-0.058	-0.057	-0.056
3.000	-0.100	-0.092	-0.085	-0.079	-0.074	-0.070	-0.066	-0.064	-0.062	-0.061	-0.061
3.500	-0.100	-0.092	-0.086	-0.081	-0.076	-0.072	-0.070	-0.067	-0.066	-0.065	-0.065
4.000	-0.100	-0.093	-0.087	-0.082	-0.078	-0.075	-0.072	-0.070	-0.069	-0.068	-0.068
5.000	-0.100	-0.093	-0.088	-0.084	-0.081	-0.078	-0.076	-0.075	-0.074	-0.073	-0.073
6.000	-0.100	-0.094	-0.089	-0.086	-0.083	-0.081	-0.079	-0.078	-0.077	-0.077	-0.077

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.420	0.442	0.460	0.498

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.857	0.954	0.985	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.993
0.040	0.836	0.941	0.977	0.991	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.991
0.060	0.819	0.929	0.970	0.986	0.993	0.997	0.998	0.999	0.999	1.000	1.000	0.99[illegible]
0.100	0.788	0.905	0.955	0.978	0.988	0.993	0.996	0.998	0.999	0.999	1.000	0.986
0.150	0.756	0.879	0.937	0.966	0.980	0.988	0.993	0.996	0.997	0.999	1.000	0.981
0.200	0.727	0.854	0.920	0.954	0.973	0.983	0.989	0.993	0.996	0.998	1.000	0.976
0.250	0.701	0.832	0.903	0.942	0.964	0.977	0.985	0.991	0.994	0.997	1.000	0.971
0.300	0.678	0.811	0.887	0.930	0.956	0.971	0.981	0.988	0.993	0.997	1.000	0.967
0.400	0.636	0.773	0.857	0.907	0.939	0.959	0.972	0.982	0.989	0.995	1.000	0.959
0.500	0.600	0.739	0.828	0.885	0.922	0.946	0.963	0.975	0.985	0.993	1.000	0.950
0.600	0.567	0.708	0.802	0.864	0.905	0.934	0.954	0.969	0.981	0.991	1.000	0.942
0.800	0.508	0.653	0.753	0.823	0.873	0.908	0.935	0.955	0.972	0.987	1.000	0.926
1.000	0.458	0.605	0.710	0.786	0.842	0.884	0.916	0.942	0.963	0.982	1.000	0.911
1.200	0.414	0.562	0.671	0.752	0.814	0.861	0.898	0.929	0.955	0.978	1.000	0.89[illegible]
1.500	0.355	0.505	0.619	0.706	0.774	0.829	0.873	0.910	0.942	0.972	1.000	0.878
2.000	0.274	0.425	0.544	0.639	0.716	0.780	0.834	0.881	0.923	0.962	1.000	0.849
2.500	0.207	0.359	0.481	0.582	0.666	0.738	0.800	0.856	0.906	0.954	1.000	0.822
3.000	0.151	0.303	0.428	0.533	0.623	0.701	0.770	0.833	0.891	0.946	1.000	0.7[illegible]
3.500	0.104	0.256	0.382	0.491	0.585	0.668	0.744	0.813	0.877	0.939	1.000	0.776
4.000	0.065	0.215	0.343	0.454	0.552	0.640	0.720	0.794	0.865	0.933	1.000	0.755

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.053	-0.028	-0.015	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.040	-0.100	-0.057	-0.032	-0.018	-0.010	-0.006	-0.003	-0.002	-0.001	-0.001	-0.001
0.060	-0.100	-0.060	-0.035	-0.021	-0.013	-0.008	-0.005	-0.003	-0.002	-0.001	-0.001
0.100	-0.100	-0.064	-0.041	-0.026	-0.017	-0.012	-0.008	-0.006	-0.004	-0.003	-0.003
0.150	-0.100	-0.068	-0.046	-0.031	-0.021	-0.015	-0.011	-0.008	-0.006	-0.005	-0.005
0.200	-0.100	-0.071	-0.050	-0.035	-0.025	-0.018	-0.014	-0.011	-0.009	-0.007	-0.007
0.250	-0.100	-0.073	-0.053	-0.038	-0.028	-0.021	-0.016	-0.013	-0.011	-0.009	-0.009
0.300	-0.100	-0.075	-0.055	-0.041	-0.031	-0.023	-0.018	-0.015	-0.012	-0.011	-0.011
0.400	-0.100	-0.077	-0.059	-0.045	-0.035	-0.028	-0.022	-0.018	-0.016	-0.015	-0.014
0.500	-0.100	-0.079	-0.062	-0.049	-0.039	-0.031	-0.026	-0.022	-0.019	-0.018	-0.017
0.600	-0.100	-0.080	-0.065	-0.052	-0.042	-0.034	-0.029	-0.025	-0.022	-0.020	-0.020
0.800	-0.100	-0.082	-0.068	-0.056	-0.047	-0.039	-0.034	-0.030	-0.027	-0.025	-0.025
1.000	-0.100	-0.084	-0.071	-0.060	-0.051	-0.043	-0.038	-0.034	-0.031	-0.029	-0.029
1.200	-0.100	-0.085	-0.073	-0.062	-0.054	-0.047	-0.042	-0.038	-0.035	-0.033	-0.033
1.500	-0.100	-0.086	-0.075	-0.065	-0.057	-0.051	-0.046	-0.042	-0.040	-0.038	-0.038
2.000	-0.100	-0.087	-0.077	-0.069	-0.062	-0.056	-0.052	-0.048	-0.046	-0.045	-0.044
2.500	-0.100	-0.088	-0.079	-0.072	-0.065	-0.060	-0.056	-0.053	-0.051	-0.050	-0.049
3.000	-0.100	-0.089	-0.081	-0.074	-0.068	-0.064	-0.060	-0.057	-0.055	-0.054	-0.054
3.500	-0.100	-0.089	-0.082	-0.075	-0.070	-0.066	-0.063	-0.060	-0.059	-0.058	-0.057
4.000	-0.100	-0.089	-0.082	-0.077	-0.072	-0.068	-0.065	-0.063	-0.061	-0.061	-0.060

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.561	0.588	0.614	0.674

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.825	0.944	0.982	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.992
0.040	0.805	0.931	0.974	0.990	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.990
0.060	0.787	0.919	0.967	0.986	0.993	0.997	0.998	0.999	0.999	1.000	1.000	0.989
0.100	0.755	0.895	0.953	0.977	0.988	0.993	0.996	0.998	0.999	0.999	1.000	0.984
0.150	0.721	0.868	0.935	0.966	0.981	0.989	0.993	0.996	0.998	0.999	1.000	0.979
0.200	0.691	0.843	0.917	0.954	0.973	0.984	0.990	0.994	0.996	0.998	1.000	0.975
0.250	0.664	0.820	0.900	0.943	0.965	0.978	0.986	0.991	0.995	0.998	1.000	0.970
0.300	0.639	0.798	0.884	0.931	0.957	0.973	0.982	0.989	0.993	0.997	1.000	0.965
0.400	0.594	0.758	0.853	0.908	0.941	0.961	0.974	0.983	0.990	0.995	1.000	0.956
0.500	0.555	0.722	0.824	0.885	0.924	0.949	0.965	0.977	0.986	0.993	1.000	0.949
0.600	0.520	0.689	0.796	0.864	0.907	0.936	0.956	0.971	0.982	0.991	1.000	0.939
0.800	0.457	0.630	0.746	0.823	0.875	0.912	0.938	0.958	0.974	0.987	1.000	0.923
1.000	0.403	0.579	0.700	0.785	0.844	0.888	0.920	0.945	0.965	0.983	1.000	0.903
1.200	0.355	0.533	0.659	0.749	0.815	0.864	0.902	0.932	0.957	0.979	1.000	0.893
1.500	0.293	0.472	0.603	0.701	0.774	0.831	0.876	0.913	0.945	0.973	1.000	0.873
2.000	0.206	0.386	0.523	0.630	0.713	0.781	0.836	0.884	0.925	0.963	1.000	0.841
2.500	0.135	0.316	0.457	0.569	0.660	0.736	0.801	0.857	0.907	0.955	1.000	0.812
3.000	0.078	0.258	0.400	0.517	0.614	0.697	0.769	0.833	0.891	0.946	1.000	0.785
3.500	0.032	0.209	0.352	0.472	0.574	0.662	0.741	0.811	0.877	0.939	1.000	0.760

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.053	-0.029	-0.015	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.040	-0.100	-0.056	-0.032	-0.018	-0.010	-0.006	-0.003	-0.002	-0.001	-0.001	-0.001
0.060	-0.100	-0.059	-0.034	-0.020	-0.012	-0.008	-0.005	-0.003	-0.002	-0.001	-0.001
0.100	-0.100	-0.063	-0.039	-0.025	-0.016	-0.011	-0.007	-0.005	-0.004	-0.003	-0.003
0.150	-0.100	-0.066	-0.044	-0.029	-0.020	-0.014	-0.010	-0.007	-0.006	-0.005	-0.005
0.200	-0.100	-0.069	-0.047	-0.033	-0.023	-0.017	-0.012	-0.009	-0.008	-0.007	-0.006
0.250	-0.100	-0.071	-0.050	-0.036	-0.026	-0.019	-0.014	-0.011	-0.009	-0.008	-0.008
0.300	-0.100	-0.073	-0.052	-0.038	-0.028	-0.021	-0.016	-0.013	-0.011	-0.010	-0.009
0.400	-0.100	-0.075	-0.056	-0.042	-0.032	-0.025	-0.020	-0.016	-0.014	-0.013	-0.012
0.500	-0.100	-0.077	-0.059	-0.046	-0.036	-0.028	-0.023	-0.019	-0.017	-0.015	-0.015
0.600	-0.100	-0.078	-0.062	-0.048	-0.039	-0.031	-0.026	-0.022	-0.019	-0.018	-0.017
0.800	-0.100	-0.081	-0.065	-0.053	-0.043	-0.036	-0.030	-0.026	-0.024	-0.022	-0.022
1.000	-0.100	-0.082	-0.068	-0.056	-0.047	-0.040	-0.034	-0.030	-0.027	-0.026	-0.025
1.200	-0.100	-0.083	-0.070	-0.059	-0.050	-0.043	-0.037	-0.034	-0.031	-0.029	-0.029
1.500	-0.100	-0.084	-0.072	-0.062	-0.053	-0.047	-0.042	-0.038	-0.035	-0.034	-0.033
2.000	-0.100	-0.085	-0.074	-0.065	-0.058	-0.052	-0.047	-0.044	-0.041	-0.040	-0.039
2.500	-0.100	-0.086	-0.076	-0.068	-0.061	-0.056	-0.051	-0.048	-0.046	-0.045	-0.044
3.000	-0.100	-0.086	-0.077	-0.070	-0.064	-0.059	-0.055	-0.052	-0.050	-0.049	-0.048
3.500	-0.100	-0.086	-0.078	-0.071	-0.066	-0.061	-0.058	-0.055	-0.053	-0.052	-0.052

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.100	0.500	1.000	3.000
	0.705	0.736	0.768	0.839

CASE II - CONSTANT TERMINAL RATE

AND SEALED EXTERNAL BOUNDARY

$$(\overline{\rho q_x})_w = -0.10$$

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 0.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.981	0.993	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999
0.040	0.960	0.978	0.989	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.997
0.060	0.951	0.967	0.980	0.989	0.994	0.997	0.999	0.999	1.000	1.000	1.000	0.995
0.100	0.932	0.951	0.965	0.976	0.985	0.990	0.994	0.997	0.998	0.999	0.999	0.991
0.150	0.917	0.935	0.950	0.963	0.973	0.981	0.987	0.991	0.993	0.995	0.995	0.986
0.200	0.902	0.921	0.937	0.951	0.962	0.971	0.978	0.983	0.987	0.989	0.990	0.981
0.250	0.891	0.909	0.926	0.940	0.952	0.961	0.969	0.975	0.979	0.981	0.982	0.976
0.300	0.879	0.898	0.915	0.929	0.941	0.952	0.960	0.966	0.970	0.973	0.974	0.971
0.400	0.859	0.877	0.894	0.909	0.922	0.932	0.941	0.948	0.952	0.955	0.956	0.961
0.500	0.839	0.858	0.875	0.890	0.902	0.913	0.922	0.929	0.934	0.937	0.938	0.951
0.600	0.820	0.839	0.856	0.871	0.883	0.894	0.903	0.910	0.915	0.918	0.919	0.941
0.800	0.783	0.802	0.819	0.833	0.846	0.857	0.866	0.873	0.878	0.881	0.882	0.921
1.000	0.747	0.765	0.782	0.797	0.810	0.821	0.830	0.837	0.841	0.844	0.845	0.901
1.200	0.711	0.730	0.747	0.762	0.774	0.785	0.794	0.801	0.806	0.809	0.810	0.881
1.500	0.659	0.678	0.695	0.710	0.723	0.733	0.742	0.749	0.754	0.757	0.758	0.851
2.000	0.576	0.596	0.612	0.627	0.640	0.651	0.660	0.667	0.671	0.674	0.675	0.801
2.500	0.499	0.518	0.535	0.550	0.563	0.573	0.582	0.589	0.594	0.597	0.598	0.751
3.000	0.427	0.446	0.463	0.477	0.490	0.501	0.510	0.516	0.521	0.524	0.525	0.702
3.500	0.360	0.378	0.395	0.410	0.423	0.433	0.442	0.449	0.454	0.457	0.458	0.652
4.000	0.297	0.316	0.333	0.347	0.360	0.371	0.379	0.386	0.391	0.394	0.395	0.602
4.500	0.240	0.259	0.275	0.290	0.303	0.313	0.322	0.329	0.333	0.336	0.337	0.552
5.000	0.187	0.206	0.223	0.238	0.250	0.261	0.269	0.276	0.281	0.283	0.284	0.502
5.500	0.141	0.159	0.176	0.190	0.203	0.213	0.222	0.228	0.233	0.236	0.237	0.452
6.000	0.098	0.117	0.134	0.148	0.161	0.171	0.179	0.186	0.190	0.193	0.194	0.402
6.500	0.062	0.081	0.097	0.111	0.123	0.133	0.142	0.148	0.152	0.155	0.156	0.352
7.000	0.031	0.050	0.066	0.080	0.091	0.101	0.109	0.115	0.120	0.122	0.123	0.302

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 0.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.036	-0.013	-0.004	-0.001	0.0	0.001	0.001	0.000	0.000	0.000
0.040	-0.100	-0.071	-0.039	-0.019	-0.008	-0.004	-0.001	0.0	0.001	0.001	0.000
0.060	-0.100	-0.073	-0.052	-0.033	-0.019	-0.010	-0.005	-0.001	0.0	0.0	0.000
0.100	-0.100	-0.081	-0.062	-0.046	-0.035	-0.023	-0.014	-0.008	-0.004	-0.001	0.000
0.150	-0.100	-0.083	-0.070	-0.056	-0.043	-0.033	-0.024	-0.017	-0.010	-0.004	0.000
0.200	-0.100	-0.086	-0.073	-0.061	-0.050	-0.039	-0.030	-0.021	-0.013	-0.006	0.000
0.250	-0.100	-0.087	-0.076	-0.064	-0.052	-0.043	-0.033	-0.024	-0.015	-0.007	0.000
0.300	-0.100	-0.088	-0.076	-0.065	-0.055	-0.045	-0.036	-0.026	-0.017	-0.008	0.000
0.400	-0.100	-0.088	-0.079	-0.068	-0.057	-0.048	-0.038	-0.027	-0.018	-0.008	0.000
0.500	-0.100	-0.088	-0.079	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.008	0.000
0.600	-0.100	-0.089	-0.079	-0.068	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
0.800	-0.100	-0.088	-0.079	-0.069	-0.058	-0.049	-0.039	-0.029	-0.019	-0.008	0.000
1.000	-0.100	-0.089	-0.079	-0.068	-0.058	-0.049	-0.039	-0.029	-0.019	-0.008	0.000
1.200	-0.100	-0.088	-0.079	-0.068	-0.058	-0.049	-0.039	-0.029	-0.019	-0.008	0.000
1.500	-0.100	-0.089	-0.079	-0.068	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
2.000	-0.100	-0.088	-0.079	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.008	0.000
2.500	-0.100	-0.089	-0.079	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.008	0.000
3.000	-0.100	-0.088	-0.079	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.008	0.000
3.500	-0.100	-0.088	-0.079	-0.068	-0.057	-0.048	-0.038	-0.029	-0.018	-0.008	0.000
4.000	-0.100	-0.088	-0.077	-0.068	-0.057	-0.048	-0.038	-0.029	-0.018	-0.008	0.000
4.500	-0.100	-0.088	-0.077	-0.067	-0.057	-0.048	-0.038	-0.027	-0.018	-0.008	0.000
5.000	-0.100	-0.088	-0.077	-0.067	-0.057	-0.048	-0.037	-0.027	-0.018	-0.008	0.000
5.500	-0.100	-0.088	-0.077	-0.067	-0.056	-0.046	-0.037	-0.027	-0.018	-0.008	0.000
6.000	-0.100	-0.087	-0.076	-0.065	-0.056	-0.046	-0.036	-0.026	-0.018	-0.008	0.000
6.500	-0.100	-0.087	-0.075	-0.064	-0.055	-0.045	-0.036	-0.026	-0.017	-0.008	0.000
7.000	-0.100	-0.085	-0.074	-0.063	-0.052	-0.043	-0.035	-0.025	-0.017	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.005	0.009	0.015	0.025	0.050

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.955	0.966	0.996	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.998
0.040	0.932	0.972	0.988	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.996
0.060	0.916	0.959	0.980	0.990	0.995	0.997	0.999	0.999	1.000	1.000	1.000	0.994
0.100	0.891	0.937	0.964	0.979	0.988	0.993	0.996	0.998	0.999	0.999	0.999	0.990
0.150	0.866	0.915	0.946	0.966	0.978	0.986	0.991	0.994	0.996	0.997	0.997	0.985
0.200	0.845	0.896	0.930	0.953	0.968	0.978	0.985	0.989	0.992	0.993	0.994	0.980
0.250	0.827	0.879	0.915	0.940	0.958	0.970	0.978	0.983	0.987	0.989	0.989	0.975
0.300	0.811	0.863	0.901	0.928	0.948	0.961	0.971	0.977	0.981	0.983	0.984	0.970
0.400	0.782	0.835	0.875	0.905	0.927	0.944	0.955	0.963	0.968	0.970	0.971	0.960
0.500	0.757	0.810	0.852	0.884	0.908	0.925	0.938	0.947	0.953	0.955	0.956	0.950
0.600	0.734	0.787	0.830	0.863	0.888	0.907	0.921	0.931	0.937	0.940	0.941	0.940
0.800	0.691	0.745	0.789	0.824	0.851	0.871	0.886	0.896	0.903	0.906	0.907	0.920
1.000	0.652	0.706	0.751	0.786	0.814	0.835	0.851	0.861	0.868	0.872	0.873	0.900
1.200	0.615	0.670	0.714	0.750	0.778	0.800	0.816	0.827	0.834	0.837	0.838	0.880
1.500	0.563	0.617	0.662	0.693	0.726	0.748	0.764	0.775	0.782	0.786	0.787	0.850
2.000	0.480	0.535	0.580	0.615	0.644	0.666	0.682	0.693	0.700	0.704	0.705	0.800
2.500	0.404	0.456	0.503	0.533	0.557	0.588	0.604	0.615	0.622	0.626	0.627	0.750
3.000	0.332	0.387	0.431	0.466	0.494	0.516	0.532	0.543	0.550	0.553	0.554	0.700
3.500	0.266	0.320	0.364	0.400	0.427	0.449	0.464	0.475	0.482	0.486	0.487	0.650
4.000	0.205	0.259	0.303	0.333	0.365	0.386	0.402	0.412	0.419	0.423	0.424	0.600
4.500	0.150	0.204	0.247	0.281	0.308	0.329	0.344	0.355	0.361	0.365	0.366	0.550
5.000	0.101	0.154	0.196	0.230	0.257	0.277	0.292	0.302	0.309	0.312	0.313	0.500
5.500	0.057	0.110	0.151	0.184	0.210	0.230	0.244	0.254	0.261	0.264	0.265	0.450
6.000	0.021	0.073	0.113	0.144	0.169	0.188	0.202	0.212	0.218	0.221	0.222	0.400

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.043	-0.018	-0.007	-0.003	-0.001	-0.000	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.058	-0.031	-0.016	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000	0.000
0.060	-0.100	-0.065	-0.040	-0.023	-0.014	-0.008	-0.004	-0.002	-0.001	-0.000	0.000
0.100	-0.100	-0.072	-0.050	-0.034	-0.022	-0.015	-0.009	-0.006	-0.003	-0.001	0.000
0.150	-0.100	-0.077	-0.057	-0.042	-0.030	-0.021	-0.015	-0.010	-0.006	-0.003	0.000
0.200	-0.100	-0.080	-0.062	-0.048	-0.036	-0.027	-0.019	-0.013	-0.008	-0.004	0.000
0.250	-0.100	-0.082	-0.066	-0.052	-0.040	-0.031	-0.023	-0.016	-0.010	-0.005	0.000
0.300	-0.100	-0.083	-0.068	-0.055	-0.043	-0.034	-0.026	-0.018	-0.012	-0.006	0.000
0.400	-0.100	-0.085	-0.071	-0.059	-0.048	-0.038	-0.030	-0.022	-0.014	-0.007	0.000
0.500	-0.100	-0.086	-0.074	-0.062	-0.051	-0.041	-0.032	-0.024	-0.016	-0.008	0.000
0.600	-0.100	-0.087	-0.075	-0.064	-0.053	-0.043	-0.034	-0.025	-0.017	-0.008	0.000
0.800	-0.100	-0.088	-0.077	-0.066	-0.056	-0.046	-0.036	-0.027	-0.018	-0.009	0.000
1.000	-0.100	-0.089	-0.078	-0.067	-0.057	-0.047	-0.037	-0.028	-0.018	-0.009	0.000
1.200	-0.100	-0.089	-0.078	-0.068	-0.057	-0.048	-0.038	-0.028	-0.019	-0.009	0.000
1.500	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
2.000	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
2.500	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.028	-0.019	-0.009	0.000
3.000	-0.100	-0.088	-0.078	-0.067	-0.057	-0.047	-0.038	-0.028	-0.019	-0.009	0.000
3.500	-0.100	-0.088	-0.077	-0.067	-0.057	-0.047	-0.038	-0.028	-0.019	-0.009	0.000
4.000	-0.100	-0.088	-0.077	-0.066	-0.056	-0.047	-0.037	-0.028	-0.018	-0.009	0.000
4.500	-0.100	-0.087	-0.076	-0.066	-0.056	-0.046	-0.037	-0.027	-0.018	-0.009	0.000
5.000	-0.100	-0.087	-0.075	-0.065	-0.055	-0.046	-0.036	-0.027	-0.018	-0.009	0.000
5.500	-0.100	-0.086	-0.074	-0.064	-0.054	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
6.000	-0.100	-0.084	-0.073	-0.062	-0.053	-0.044	-0.035	-0.026	-0.017	-0.009	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.099	0.103	0.108	0.116	0.137

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.928	0.930	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.997
0.040	0.905	0.966	0.987	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.995
0.060	0.887	0.952	0.979	0.990	0.995	0.998	0.999	0.999	1.000	1.000	1.000	0.993
0.100	0.857	0.929	0.964	0.981	0.989	0.994	0.996	0.998	0.999	0.999	0.999	0.989
0.150	0.827	0.903	0.945	0.968	0.981	0.988	0.992	0.995	0.997	0.997	0.998	0.984
0.200	0.802	0.881	0.928	0.955	0.972	0.981	0.988	0.991	0.994	0.995	0.995	0.979
0.250	0.780	0.861	0.911	0.943	0.962	0.974	0.982	0.987	0.990	0.991	0.992	0.974
0.300	0.760	0.842	0.896	0.930	0.952	0.967	0.976	0.982	0.985	0.987	0.987	0.969
0.400	0.725	0.809	0.867	0.906	0.933	0.951	0.962	0.970	0.974	0.977	0.977	0.959
0.500	0.694	0.780	0.841	0.883	0.913	0.934	0.948	0.957	0.962	0.965	0.966	0.949
0.600	0.667	0.753	0.816	0.862	0.894	0.917	0.932	0.943	0.949	0.952	0.952	0.939
0.800	0.617	0.704	0.771	0.820	0.856	0.882	0.900	0.912	0.919	0.923	0.924	0.919
1.000	0.573	0.661	0.729	0.781	0.819	0.848	0.867	0.880	0.888	0.892	0.893	0.899
1.200	0.533	0.621	0.690	0.744	0.784	0.813	0.834	0.847	0.856	0.860	0.861	0.879
1.500	0.477	0.565	0.636	0.690	0.732	0.762	0.784	0.798	0.807	0.811	0.812	0.849
2.000	0.392	0.482	0.552	0.607	0.649	0.681	0.703	0.718	0.727	0.731	0.732	0.799
2.500	0.316	0.405	0.475	0.530	0.572	0.604	0.626	0.641	0.650	0.654	0.655	0.749
3.000	0.246	0.334	0.404	0.459	0.501	0.532	0.554	0.568	0.577	0.582	0.583	0.699
3.500	0.182	0.270	0.339	0.393	0.434	0.465	0.486	0.501	0.510	0.514	0.515	0.649
4.000	0.124	0.211	0.279	0.332	0.372	0.403	0.424	0.438	0.447	0.451	0.452	0.599
4.500	0.072	0.159	0.225	0.277	0.316	0.346	0.367	0.380	0.389	0.393	0.394	0.549
5.000	0.029	0.113	0.178	0.227	0.266	0.294	0.314	0.328	0.336	0.340	0.341	0.499

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.045	-0.020	-0.008	-0.003	-0.001	-0.000	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.054	-0.028	-0.015	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000	0.000
0.060	-0.100	-0.060	-0.035	-0.020	-0.012	-0.007	-0.004	-0.002	-0.001	-0.000	0.000
0.100	-0.100	-0.067	-0.043	-0.028	-0.018	-0.012	-0.007	-0.005	-0.003	-0.001	0.000
0.150	-0.100	-0.072	-0.050	-0.035	-0.024	-0.017	-0.011	-0.008	-0.005	-0.002	0.000
0.200	-0.100	-0.075	-0.055	-0.040	-0.029	-0.021	-0.015	-0.010	-0.006	-0.003	0.000
0.250	-0.100	-0.077	-0.059	-0.044	-0.033	-0.024	-0.018	-0.012	-0.008	-0.004	0.000
0.300	-0.100	-0.079	-0.062	-0.047	-0.036	-0.027	-0.020	-0.014	-0.009	-0.004	0.000
0.400	-0.100	-0.082	-0.066	-0.052	-0.041	-0.032	-0.024	-0.017	-0.011	-0.006	0.000
0.500	-0.100	-0.083	-0.068	-0.055	-0.044	-0.035	-0.027	-0.020	-0.013	-0.006	0.000
0.600	-0.100	-0.084	-0.070	-0.058	-0.047	-0.038	-0.029	-0.021	-0.014	-0.007	0.000
0.800	-0.100	-0.086	-0.073	-0.061	-0.051	-0.041	-0.032	-0.024	-0.016	-0.008	0.000
1.000	-0.100	-0.087	-0.074	-0.063	-0.053	-0.043	-0.034	-0.025	-0.017	-0.008	0.000
1.200	-0.100	-0.087	-0.075	-0.064	-0.054	-0.045	-0.035	-0.026	-0.017	-0.009	0.000
1.500	-0.100	-0.088	-0.076	-0.066	-0.055	-0.046	-0.036	-0.027	-0.018	-0.009	0.000
2.000	-0.100	-0.088	-0.077	-0.066	-0.056	-0.046	-0.037	-0.028	-0.018	-0.009	0.000
2.500	-0.100	-0.088	-0.077	-0.066	-0.056	-0.046	-0.037	-0.028	-0.018	-0.009	0.000
3.000	-0.100	-0.087	-0.076	-0.066	-0.056	-0.046	-0.037	-0.027	-0.018	-0.009	0.000
3.500	-0.100	-0.087	-0.076	-0.065	-0.055	-0.046	-0.036	-0.027	-0.018	-0.009	0.000
4.000	-0.100	-0.086	-0.075	-0.065	-0.055	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
4.500	-0.100	-0.085	-0.074	-0.064	-0.054	-0.045	-0.035	-0.026	-0.018	-0.009	0.000
5.000	-0.100	-0.084	-0.073	-0.062	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.197	0.205	0.214	0.235	0.284

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.902	0.973	0.992	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.996
0.040	0.878	0.959	0.985	0.994	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.994
0.060	0.859	0.946	0.978	0.990	0.995	0.998	0.999	0.999	1.000	1.000	1.000	0.992
0.100	0.826	0.921	0.963	0.981	0.990	0.994	0.997	0.998	0.999	0.999	0.999	0.988
0.150	0.793	0.894	0.944	0.969	0.982	0.989	0.993	0.996	0.997	0.998	0.998	0.983
0.200	0.765	0.870	0.926	0.957	0.974	0.983	0.989	0.993	0.994	0.995	0.996	0.978
0.250	0.740	0.848	0.909	0.945	0.965	0.977	0.984	0.989	0.991	0.992	0.993	0.973
0.300	0.717	0.827	0.893	0.932	0.956	0.970	0.979	0.984	0.987	0.989	0.989	0.968
0.400	0.677	0.790	0.863	0.908	0.937	0.955	0.967	0.974	0.978	0.980	0.981	0.958
0.500	0.642	0.758	0.834	0.885	0.918	0.940	0.954	0.963	0.968	0.970	0.971	0.948
0.600	0.611	0.728	0.808	0.862	0.899	0.924	0.940	0.950	0.956	0.959	0.960	0.938
0.800	0.555	0.674	0.759	0.820	0.862	0.891	0.911	0.923	0.930	0.934	0.934	0.918
1.000	0.506	0.626	0.715	0.779	0.825	0.858	0.880	0.894	0.902	0.906	0.906	0.898
1.200	0.462	0.583	0.674	0.741	0.790	0.824	0.848	0.863	0.872	0.876	0.877	0.878
1.500	0.402	0.524	0.617	0.686	0.738	0.775	0.800	0.817	0.826	0.831	0.832	0.848
2.000	0.314	0.437	0.531	0.602	0.656	0.695	0.722	0.739	0.749	0.754	0.755	0.798
2.500	0.237	0.359	0.453	0.525	0.579	0.619	0.646	0.664	0.674	0.679	0.680	0.748
3.000	0.168	0.289	0.382	0.454	0.508	0.547	0.575	0.593	0.603	0.608	0.609	0.698
3.500	0.106	0.227	0.318	0.389	0.442	0.481	0.508	0.525	0.536	0.540	0.541	0.647
4.000	0.053	0.171	0.261	0.330	0.381	0.419	0.446	0.463	0.473	0.478	0.479	0.598

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.046	-0.021	-0.009	-0.004	-0.001	-0.001	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.053	-0.027	-0.014	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000	0.000
0.060	-0.100	-0.057	-0.032	-0.018	-0.011	-0.006	-0.003	-0.002	-0.001	-0.000	0.000
0.100	-0.100	-0.064	-0.040	-0.025	-0.016	-0.010	-0.006	-0.004	-0.002	-0.001	0.000
0.150	-0.100	-0.069	-0.046	-0.031	-0.021	-0.014	-0.010	-0.006	-0.004	-0.002	0.000
0.200	-0.100	-0.072	-0.051	-0.036	-0.025	-0.018	-0.012	-0.008	-0.005	-0.003	0.000
0.250	-0.100	-0.074	-0.054	-0.039	-0.029	-0.021	-0.015	-0.010	-0.007	-0.003	0.000
0.300	-0.100	-0.076	-0.057	-0.042	-0.031	-0.023	-0.017	-0.012	-0.008	-0.004	0.000
0.400	-0.100	-0.079	-0.061	-0.047	-0.036	-0.027	-0.020	-0.015	-0.009	-0.005	0.000
0.500	-0.100	-0.080	-0.064	-0.051	-0.040	-0.031	-0.023	-0.017	-0.011	-0.005	0.000
0.600	-0.100	-0.082	-0.066	-0.053	-0.042	-0.033	-0.025	-0.018	-0.012	-0.006	0.000
0.800	-0.100	-0.084	-0.069	-0.057	-0.046	-0.037	-0.029	-0.021	-0.014	-0.007	0.000
1.000	-0.100	-0.085	-0.071	-0.059	-0.049	-0.040	-0.031	-0.023	-0.015	-0.007	0.000
1.200	-0.100	-0.085	-0.073	-0.061	-0.051	-0.041	-0.032	-0.024	-0.016	-0.008	0.000
1.500	-0.100	-0.086	-0.074	-0.063	-0.053	-0.043	-0.034	-0.025	-0.017	-0.008	0.000
2.000	-0.100	-0.086	-0.075	-0.064	-0.054	-0.044	-0.035	-0.026	-0.017	-0.008	0.000
2.500	-0.100	-0.086	-0.075	-0.064	-0.054	-0.045	-0.036	-0.026	-0.018	-0.009	0.000
3.000	-0.100	-0.086	-0.075	-0.064	-0.054	-0.045	-0.036	-0.026	-0.018	-0.009	0.000
3.500	-0.100	-0.085	-0.074	-0.064	-0.054	-0.044	-0.035	-0.026	-0.017	-0.009	0.000
4.000	-0.100	-0.084	-0.073	-0.063	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.296	0.305	0.318	0.348	0.417

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.875	0.967	0.991	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.995
0.040	0.852	0.953	0.983	0.994	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.993
0.060	0.832	0.939	0.976	0.990	0.995	0.998	0.999	0.999	1.000	1.000	1.000	0.991
0.100	0.797	0.914	0.962	0.981	0.990	0.995	0.997	0.998	0.999	0.999	0.999	0.987
0.150	0.762	0.886	0.943	0.970	0.983	0.990	0.994	0.996	0.997	0.998	0.998	0.982
0.200	0.731	0.861	0.926	0.955	0.975	0.985	0.990	0.993	0.995	0.996	0.996	0.977
0.250	0.704	0.837	0.908	0.946	0.967	0.979	0.986	0.990	0.992	0.993	0.994	0.972
0.300	0.679	0.815	0.892	0.934	0.958	0.973	0.981	0.986	0.989	0.990	0.991	0.967
0.400	0.635	0.778	0.860	0.910	0.941	0.959	0.970	0.977	0.981	0.983	0.983	0.957
0.500	0.597	0.740	0.831	0.887	0.922	0.945	0.959	0.967	0.972	0.974	0.975	0.947
0.600	0.562	0.708	0.803	0.864	0.904	0.929	0.946	0.956	0.961	0.964	0.965	0.937
0.800	0.501	0.650	0.752	0.821	0.867	0.898	0.918	0.931	0.938	0.941	0.942	0.917
1.000	0.448	0.599	0.705	0.779	0.831	0.866	0.889	0.904	0.912	0.916	0.917	0.897
1.200	0.401	0.553	0.662	0.740	0.796	0.834	0.859	0.876	0.885	0.889	0.890	0.877
1.500	0.337	0.490	0.603	0.665	0.744	0.786	0.814	0.832	0.842	0.846	0.847	0.847
2.000	0.245	0.400	0.514	0.600	0.663	0.707	0.738	0.757	0.768	0.773	0.774	0.797
2.500	0.167	0.321	0.436	0.523	0.587	0.633	0.664	0.684	0.696	0.701	0.702	0.747
3.000	0.100	0.252	0.366	0.452	0.516	0.562	0.594	0.614	0.626	0.631	0.632	0.697
3.500	0.044	0.192	0.304	0.388	0.451	0.497	0.528	0.548	0.560	0.565	0.566	0.647

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.047	-0.022	-0.010	-0.004	-0.002	-0.001	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.052	-0.027	-0.014	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000	0.000
0.060	-0.100	-0.056	-0.031	-0.017	-0.010	-0.006	-0.003	-0.002	-0.001	-0.000	0.000
0.100	-0.100	-0.061	-0.037	-0.023	-0.014	-0.009	-0.006	-0.004	-0.002	-0.001	0.000
0.150	-0.100	-0.066	-0.043	-0.028	-0.019	-0.013	-0.008	-0.006	-0.003	-0.002	0.000
0.200	-0.100	-0.069	-0.047	-0.032	-0.022	-0.016	-0.011	-0.007	-0.005	-0.002	0.000
0.250	-0.100	-0.072	-0.051	-0.036	-0.025	-0.018	-0.013	-0.009	-0.006	-0.003	0.000
0.300	-0.100	-0.073	-0.053	-0.039	-0.028	-0.021	-0.015	-0.010	-0.007	-0.003	0.000
0.400	-0.100	-0.076	-0.057	-0.043	-0.033	-0.024	-0.018	-0.013	-0.008	-0.004	0.000
0.500	-0.100	-0.078	-0.061	-0.047	-0.036	-0.027	-0.021	-0.015	-0.010	-0.005	0.000
0.600	-0.100	-0.080	-0.063	-0.049	-0.039	-0.030	-0.023	-0.016	-0.011	-0.005	0.000
0.800	-0.100	-0.081	-0.065	-0.053	-0.043	-0.034	-0.026	-0.019	-0.012	-0.006	0.000
1.000	-0.100	-0.083	-0.068	-0.056	-0.046	-0.036	-0.028	-0.021	-0.014	-0.007	0.000
1.200	-0.100	-0.084	-0.070	-0.058	-0.048	-0.038	-0.030	-0.022	-0.014	-0.007	0.000
1.500	-0.100	-0.084	-0.071	-0.060	-0.050	-0.040	-0.032	-0.023	-0.015	-0.008	0.000
2.000	-0.100	-0.085	-0.073	-0.062	-0.052	-0.042	-0.033	-0.025	-0.016	-0.008	0.000
2.500	-0.100	-0.085	-0.073	-0.062	-0.052	-0.043	-0.034	-0.025	-0.017	-0.008	0.000
3.000	-0.100	-0.084	-0.073	-0.062	-0.052	-0.043	-0.034	-0.025	-0.017	-0.008	0.000
3.500	-0.100	-0.083	-0.072	-0.062	-0.052	-0.043	-0.034	-0.025	-0.017	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.395	0.405	0.421	0.457	0.543

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.849	0.960	0.989	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.994
0.040	0.825	0.946	0.982	0.993	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.992
0.060	0.805	0.933	0.975	0.989	0.995	0.998	0.999	0.999	1.000	1.000	1.000	0.990
0.100	0.769	0.908	0.960	0.981	0.990	0.995	0.997	0.998	0.999	0.999	0.999	0.986
0.150	0.732	0.879	0.942	0.970	0.984	0.991	0.994	0.996	0.997	0.998	0.998	0.981
0.200	0.699	0.852	0.925	0.959	0.976	0.986	0.991	0.994	0.995	0.996	0.996	0.976
0.250	0.670	0.828	0.907	0.947	0.969	0.980	0.987	0.991	0.993	0.994	0.994	0.971
0.300	0.644	0.805	0.890	0.936	0.960	0.974	0.983	0.987	0.990	0.991	0.992	0.966
0.400	0.596	0.763	0.858	0.912	0.943	0.962	0.973	0.979	0.983	0.985	0.985	0.956
0.500	0.555	0.726	0.828	0.889	0.926	0.948	0.962	0.970	0.975	0.977	0.977	0.946
0.600	0.518	0.692	0.799	0.866	0.908	0.934	0.950	0.960	0.965	0.968	0.968	0.936
0.800	0.453	0.630	0.746	0.822	0.872	0.904	0.924	0.937	0.944	0.947	0.948	0.916
1.000	0.396	0.576	0.698	0.781	0.836	0.873	0.897	0.912	0.920	0.924	0.924	0.896
1.200	0.346	0.528	0.654	0.741	0.801	0.842	0.869	0.885	0.894	0.899	0.899	0.876
1.500	0.279	0.463	0.593	0.685	0.750	0.795	0.825	0.844	0.854	0.859	0.860	0.846
2.000	0.185	0.369	0.502	0.600	0.670	0.719	0.752	0.773	0.784	0.789	0.790	0.796
2.500	0.107	0.290	0.424	0.522	0.594	0.646	0.680	0.702	0.714	0.720	0.721	0.746
3.000	0.044	0.223	0.354	0.452	0.525	0.576	0.612	0.634	0.646	0.652	0.653	0.696

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.047	-0.022	-0.010	-0.004	-0.002	-0.001	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.051	-0.026	-0.014	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000	0.000
0.060	-0.100	-0.054	-0.030	-0.017	-0.009	-0.005	-0.003	-0.002	-0.001	-0.000	0.000
0.100	-0.100	-0.059	-0.035	-0.021	-0.013	-0.008	-0.005	-0.003	-0.002	-0.001	0.000
0.150	-0.100	-0.064	-0.040	-0.026	-0.017	-0.011	-0.008	-0.005	-0.003	-0.001	0.000
0.200	-0.100	-0.067	-0.045	-0.030	-0.020	-0.014	-0.010	-0.007	-0.004	-0.002	0.000
0.250	-0.100	-0.069	-0.048	-0.033	-0.023	-0.016	-0.012	-0.008	-0.005	-0.002	0.000
0.300	-0.100	-0.071	-0.050	-0.036	-0.026	-0.019	-0.013	-0.009	-0.006	-0.003	0.000
0.400	-0.100	-0.074	-0.055	-0.040	-0.030	-0.022	-0.016	-0.011	-0.007	-0.004	0.000
0.500	-0.100	-0.076	-0.058	-0.044	-0.033	-0.025	-0.019	-0.013	-0.009	-0.004	0.000
0.600	-0.100	-0.078	-0.060	-0.046	-0.036	-0.027	-0.021	-0.015	-0.010	-0.005	0.000
0.800	-0.100	-0.080	-0.063	-0.050	-0.040	-0.031	-0.024	-0.017	-0.011	-0.005	0.000
1.000	-0.100	-0.081	-0.066	-0.053	-0.043	-0.034	-0.026	-0.019	-0.012	-0.006	0.000
1.200	-0.100	-0.082	-0.067	-0.055	-0.045	-0.036	-0.028	-0.020	-0.013	-0.007	0.000
1.500	-0.100	-0.083	-0.069	-0.057	-0.047	-0.038	-0.030	-0.022	-0.014	-0.007	0.000
2.000	-0.100	-0.083	-0.071	-0.059	-0.049	-0.040	-0.032	-0.023	-0.015	-0.008	0.000
2.500	-0.100	-0.083	-0.071	-0.060	-0.050	-0.041	-0.033	-0.024	-0.016	-0.008	0.000
3.000	-0.100	-0.082	-0.070	-0.060	-0.051	-0.042	-0.033	-0.024	-0.016	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.495	0.505	0.523	0.564	0.660

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 0.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.982	0.993	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999
0.040	0.964	0.979	0.989	0.994	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.997
0.060	0.955	0.969	0.980	0.988	0.993	0.996	0.998	0.999	1.000	1.000	1.000	0.995
0.100	0.936	0.954	0.966	0.976	0.984	0.989	0.993	0.996	0.997	0.998	0.998	0.991
0.150	0.924	0.939	0.952	0.963	0.972	0.979	0.985	0.989	0.992	0.993	0.994	0.986
0.200	0.911	0.927	0.940	0.952	0.962	0.970	0.976	0.981	0.984	0.986	0.987	0.981
0.250	0.900	0.915	0.929	0.941	0.951	0.960	0.967	0.972	0.976	0.978	0.978	0.976
0.300	0.889	0.905	0.919	0.931	0.941	0.950	0.957	0.963	0.967	0.969	0.970	0.971
0.400	0.870	0.885	0.899	0.911	0.922	0.931	0.938	0.944	0.948	0.950	0.951	0.961
0.500	0.850	0.866	0.880	0.892	0.903	0.912	0.919	0.925	0.929	0.931	0.932	0.951
0.600	0.832	0.847	0.861	0.873	0.884	0.893	0.900	0.906	0.910	0.912	0.913	0.941
0.800	0.794	0.810	0.824	0.836	0.847	0.856	0.863	0.869	0.873	0.875	0.876	0.921
1.000	0.759	0.774	0.788	0.800	0.810	0.819	0.827	0.832	0.836	0.839	0.840	0.901
1.200	0.723	0.739	0.752	0.764	0.775	0.784	0.791	0.797	0.801	0.803	0.804	0.881
1.500	0.672	0.687	0.701	0.713	0.723	0.732	0.739	0.745	0.749	0.751	0.752	0.851
2.000	0.590	0.605	0.618	0.630	0.641	0.649	0.656	0.662	0.666	0.668	0.669	0.802
2.500	0.513	0.528	0.541	0.553	0.563	0.572	0.579	0.584	0.588	0.590	0.591	0.752
3.000	0.441	0.456	0.469	0.481	0.491	0.499	0.506	0.511	0.515	0.518	0.518	0.702
3.500	0.375	0.389	0.402	0.413	0.423	0.431	0.438	0.444	0.447	0.450	0.450	0.652
4.000	0.313	0.326	0.340	0.351	0.361	0.369	0.375	0.381	0.384	0.386	0.387	0.602
4.500	0.257	0.271	0.283	0.294	0.303	0.311	0.318	0.323	0.326	0.328	0.329	0.552
5.000	0.206	0.219	0.231	0.241	0.251	0.258	0.265	0.270	0.273	0.275	0.276	0.502
5.500	0.160	0.173	0.184	0.194	0.203	0.211	0.217	0.221	0.225	0.227	0.227	0.452
6.000	0.119	0.132	0.142	0.152	0.161	0.168	0.174	0.178	0.181	0.183	0.184	0.402
6.500	0.084	0.096	0.106	0.115	0.123	0.130	0.135	0.140	0.143	0.145	0.145	0.352
7.000	0.055	0.065	0.075	0.083	0.091	0.097	0.102	0.106	0.109	0.111	0.112	0.302

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 0.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.038	-0.014	-0.005	-0.001	0.0	0.0	0.001	0.001	0.000	0.000
0.040	-0.100	-0.075	-0.044	-0.023	-0.011	-0.005	-0.002	0.0	0.0	0.001	0.000
0.060	-0.100	-0.075	-0.057	-0.038	-0.023	-0.013	-0.007	-0.004	-0.001	0.0	0.000
0.100	-0.100	-0.083	-0.064	-0.050	-0.038	-0.027	-0.018	-0.012	-0.006	-0.002	0.000
0.150	-0.100	-0.085	-0.073	-0.060	-0.048	-0.037	-0.027	-0.019	-0.012	-0.005	0.000
0.200	-0.100	-0.087	-0.074	-0.063	-0.052	-0.043	-0.032	-0.024	-0.015	-0.007	0.000
0.250	-0.100	-0.087	-0.077	-0.065	-0.055	-0.045	-0.036	-0.025	-0.017	-0.007	0.000
0.300	-0.100	-0.088	-0.077	-0.067	-0.056	-0.046	-0.037	-0.027	-0.018	-0.008	0.000
0.400	-0.100	-0.089	-0.079	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.010	0.000
0.500	-0.100	-0.089	-0.079	-0.069	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
0.600	-0.100	-0.089	-0.080	-0.069	-0.058	-0.049	-0.039	-0.029	-0.019	-0.008	0.000
0.800	-0.100	-0.089	-0.079	-0.069	-0.058	-0.049	-0.038	-0.029	-0.019	-0.010	0.000
1.000	-0.100	-0.089	-0.079	-0.068	-0.058	-0.049	-0.039	-0.029	-0.019	-0.010	0.000
1.200	-0.100	-0.086	-0.079	-0.069	-0.058	-0.049	-0.039	-0.029	-0.019	-0.010	0.000
1.500	-0.100	-0.089	-0.079	-0.069	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
2.000	-0.100	-0.088	-0.079	-0.069	-0.058	-0.048	-0.039	-0.029	-0.019	-0.008	0.000
2.500	-0.100	-0.088	-0.079	-0.068	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
3.000	-0.100	-0.089	-0.079	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.010	0.000
3.500	-0.100	-0.089	-0.079	-0.068	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
4.000	-0.100	-0.088	-0.077	-0.068	-0.058	-0.048	-0.038	-0.029	-0.018	-0.008	0.000
4.500	-0.100	-0.088	-0.079	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.008	0.000
5.000	-0.100	-0.088	-0.077	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.008	0.000
5.500	-0.100	-0.088	-0.079	-0.068	-0.057	-0.048	-0.038	-0.029	-0.018	-0.008	0.000
6.000	-0.100	-0.088	-0.077	-0.068	-0.057	-0.048	-0.037	-0.027	-0.018	-0.008	0.000
6.500	-0.100	-0.088	-0.077	-0.067	-0.056	-0.048	-0.038	-0.027	-0.018	-0.008	0.000
7.000	-0.100	-0.087	-0.076	-0.067	-0.057	-0.046	-0.037	-0.027	-0.018	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.005	0.010	0.019	0.035	0.069

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.954	0.985	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.998
0.040	0.932	0.971	0.987	0.994	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.996
0.060	0.916	0.959	0.979	0.989	0.994	0.997	0.998	0.999	1.000	1.000	1.000	0.994
0.100	0.893	0.938	0.964	0.979	0.987	0.992	0.995	0.997	0.998	0.999	0.999	0.990
0.150	0.870	0.916	0.946	0.965	0.977	0.985	0.990	0.993	0.995	0.996	0.996	0.985
0.200	0.850	0.898	0.930	0.952	0.967	0.977	0.984	0.988	0.990	0.992	0.992	0.980
0.250	0.833	0.881	0.916	0.940	0.957	0.969	0.976	0.982	0.985	0.987	0.987	0.975
0.300	0.817	0.860	0.902	0.928	0.947	0.960	0.969	0.975	0.979	0.981	0.981	0.970
0.400	0.789	0.839	0.877	0.906	0.927	0.942	0.953	0.960	0.965	0.967	0.968	0.960
0.500	0.765	0.815	0.854	0.884	0.907	0.924	0.936	0.944	0.949	0.952	0.952	0.950
0.600	0.742	0.793	0.833	0.864	0.888	0.906	0.918	0.927	0.933	0.935	0.936	0.940
0.800	0.701	0.751	0.792	0.825	0.850	0.869	0.883	0.892	0.898	0.901	0.902	0.920
1.000	0.662	0.713	0.755	0.788	0.814	0.833	0.847	0.857	0.863	0.866	0.867	0.900
1.200	0.626	0.677	0.718	0.752	0.778	0.798	0.812	0.822	0.828	0.831	0.832	0.880
1.500	0.574	0.625	0.666	0.700	0.726	0.746	0.760	0.771	0.777	0.780	0.781	0.850
2.000	0.493	0.543	0.584	0.617	0.644	0.663	0.678	0.688	0.694	0.697	0.698	0.800
2.500	0.416	0.467	0.508	0.540	0.566	0.586	0.600	0.610	0.616	0.619	0.620	0.750
3.000	0.346	0.395	0.436	0.468	0.494	0.513	0.528	0.537	0.543	0.546	0.547	0.700
3.500	0.280	0.329	0.369	0.402	0.427	0.446	0.460	0.469	0.475	0.478	0.479	0.650
4.000	0.220	0.269	0.308	0.340	0.365	0.383	0.397	0.406	0.412	0.415	0.416	0.599
4.500	0.165	0.213	0.252	0.283	0.307	0.326	0.339	0.348	0.354	0.357	0.358	0.549
5.000	0.116	0.164	0.202	0.232	0.255	0.273	0.286	0.295	0.301	0.304	0.304	0.499
5.500	0.074	0.120	0.156	0.186	0.209	0.226	0.239	0.247	0.252	0.255	0.256	0.449
6.000	0.037	0.082	0.117	0.145	0.167	0.184	0.196	0.204	0.209	0.212	0.212	0.399

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.047	-0.022	-0.009	-0.004	-0.002	-0.001	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.060	-0.034	-0.019	-0.010	-0.005	-0.003	-0.001	-0.001	-0.000	0.000
0.060	-0.100	-0.067	-0.042	-0.026	-0.016	-0.009	-0.006	-0.003	-0.002	-0.001	0.000
0.100	-0.100	-0.073	-0.052	-0.036	-0.025	-0.017	-0.011	-0.007	-0.004	-0.002	0.000
0.150	-0.100	-0.078	-0.059	-0.044	-0.032	-0.023	-0.017	-0.011	-0.007	-0.003	0.000
0.200	-0.100	-0.081	-0.064	-0.049	-0.038	-0.028	-0.021	-0.015	-0.009	-0.005	0.000
0.250	-0.100	-0.083	-0.067	-0.053	-0.042	-0.032	-0.024	-0.017	-0.011	-0.006	0.000
0.300	-0.100	-0.084	-0.069	-0.056	-0.045	-0.035	-0.027	-0.020	-0.013	-0.006	0.000
0.400	-0.100	-0.086	-0.072	-0.060	-0.049	-0.040	-0.031	-0.023	-0.015	-0.007	0.000
0.500	-0.100	-0.087	-0.074	-0.063	-0.052	-0.042	-0.033	-0.025	-0.016	-0.008	0.000
0.600	-0.100	-0.088	-0.076	-0.065	-0.054	-0.044	-0.035	-0.026	-0.017	-0.008	0.000
0.800	-0.100	-0.088	-0.077	-0.067	-0.056	-0.046	-0.037	-0.027	-0.018	-0.009	0.000
1.000	-0.100	-0.089	-0.078	-0.068	-0.057	-0.048	-0.038	-0.028	-0.019	-0.009	0.000
1.200	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
1.500	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
2.000	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
2.500	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
3.000	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
3.500	-0.100	-0.089	-0.078	-0.067	-0.057	-0.048	-0.038	-0.028	-0.019	-0.009	0.000
4.000	-0.100	-0.088	-0.077	-0.067	-0.057	-0.047	-0.038	-0.028	-0.019	-0.009	0.000
4.500	-0.100	-0.088	-0.077	-0.067	-0.057	-0.047	-0.037	-0.028	-0.019	-0.009	0.000
5.000	-0.100	-0.087	-0.076	-0.066	-0.056	-0.046	-0.037	-0.028	-0.018	-0.009	0.000
5.500	-0.100	-0.087	-0.076	-0.065	-0.055	-0.046	-0.036	-0.027	-0.018	-0.009	0.000
6.000	-0.100	-0.086	-0.074	-0.064	-0.054	-0.045	-0.036	-0.027	-0.018	-0.009	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.120	0.125	0.130	0.141	0.169

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.924	0.977	0.992	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.997
0.040	0.903	0.963	0.985	0.993	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.995
0.060	0.886	0.950	0.977	0.987	0.994	0.997	0.998	0.999	1.000	1.000	1.000	0.993
0.100	0.857	0.927	0.962	0.979	0.988	0.993	0.996	0.997	0.998	0.999	0.999	0.989
0.150	0.829	0.903	0.944	0.967	0.980	0.987	0.992	0.994	0.996	0.997	0.997	0.984
0.200	0.803	0.881	0.927	0.954	0.970	0.980	0.986	0.990	0.992	0.994	0.994	0.979
0.250	0.784	0.861	0.911	0.942	0.961	0.973	0.981	0.985	0.988	0.990	0.990	0.974
0.300	0.764	0.843	0.896	0.929	0.951	0.965	0.974	0.980	0.983	0.985	0.986	0.969
0.400	0.730	0.811	0.867	0.906	0.932	0.949	0.961	0.968	0.972	0.974	0.975	0.959
0.500	0.700	0.732	0.841	0.883	0.912	0.932	0.946	0.954	0.959	0.962	0.962	0.949
0.600	0.673	0.756	0.817	0.861	0.893	0.915	0.930	0.940	0.945	0.948	0.949	0.939
0.800	0.625	0.709	0.773	0.820	0.855	0.880	0.898	0.909	0.915	0.919	0.919	0.918
1.000	0.581	0.666	0.732	0.781	0.818	0.845	0.864	0.876	0.883	0.887	0.888	0.898
1.200	0.542	0.627	0.693	0.744	0.783	0.811	0.830	0.843	0.851	0.854	0.855	0.878
1.500	0.487	0.572	0.639	0.691	0.731	0.760	0.780	0.794	0.801	0.805	0.806	0.848
2.000	0.403	0.488	0.556	0.608	0.648	0.678	0.699	0.713	0.721	0.724	0.725	0.798
2.500	0.327	0.412	0.479	0.531	0.571	0.601	0.622	0.635	0.643	0.647	0.648	0.748
3.000	0.258	0.342	0.408	0.460	0.499	0.529	0.549	0.563	0.571	0.574	0.575	0.698
3.500	0.194	0.277	0.343	0.394	0.433	0.461	0.482	0.495	0.503	0.506	0.507	0.648
4.000	0.137	0.219	0.283	0.333	0.371	0.399	0.419	0.432	0.440	0.443	0.444	0.598
4.500	0.086	0.166	0.229	0.276	0.315	0.342	0.361	0.374	0.381	0.385	0.386	0.548
5.000	0.042	0.120	0.181	0.228	0.263	0.290	0.309	0.321	0.328	0.331	0.332	0.498

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.049	-0.024	-0.011	-0.005	-0.002	-0.001	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.057	-0.031	-0.017	-0.010	-0.005	-0.003	-0.001	-0.001	-0.000	0.000
0.060	-0.100	-0.062	-0.037	-0.022	-0.013	-0.008	-0.005	-0.003	-0.002	-0.001	0.000
0.100	-0.100	-0.068	-0.045	-0.030	-0.020	-0.013	-0.009	-0.006	-0.003	-0.002	0.000
0.150	-0.100	-0.073	-0.052	-0.037	-0.026	-0.018	-0.013	-0.009	-0.005	-0.003	0.000
0.200	-0.100	-0.076	-0.057	-0.042	-0.031	-0.022	-0.016	-0.011	-0.007	-0.003	0.000
0.250	-0.100	-0.078	-0.060	-0.045	-0.034	-0.026	-0.019	-0.013	-0.009	-0.004	0.000
0.300	-0.100	-0.080	-0.063	-0.049	-0.037	-0.029	-0.021	-0.015	-0.010	-0.005	0.000
0.400	-0.100	-0.082	-0.066	-0.053	-0.042	-0.033	-0.025	-0.018	-0.012	-0.006	0.000
0.500	-0.100	-0.084	-0.069	-0.056	-0.046	-0.036	-0.028	-0.020	-0.013	-0.007	0.000
0.600	-0.100	-0.085	-0.071	-0.059	-0.048	-0.038	-0.030	-0.022	-0.014	-0.007	0.000
0.800	-0.100	-0.086	-0.073	-0.062	-0.051	-0.042	-0.033	-0.024	-0.016	-0.008	0.000
1.000	-0.100	-0.087	-0.075	-0.064	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000
1.200	-0.100	-0.087	-0.076	-0.065	-0.055	-0.045	-0.036	-0.026	-0.018	-0.009	0.000
1.500	-0.100	-0.088	-0.077	-0.066	-0.056	-0.046	-0.037	-0.027	-0.018	-0.009	0.000
2.000	-0.100	-0.088	-0.077	-0.067	-0.057	-0.047	-0.037	-0.028	-0.018	-0.009	0.000
2.500	-0.100	-0.088	-0.077	-0.067	-0.057	-0.047	-0.037	-0.028	-0.018	-0.009	0.000
3.000	-0.100	-0.088	-0.077	-0.066	-0.056	-0.047	-0.037	-0.028	-0.018	-0.009	0.000
3.500	-0.100	-0.087	-0.076	-0.066	-0.056	-0.046	-0.037	-0.027	-0.018	-0.009	0.000
4.000	-0.100	-0.087	-0.076	-0.065	-0.055	-0.046	-0.036	-0.027	-0.018	-0.009	0.000
4.500	-0.100	-0.086	-0.075	-0.064	-0.055	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
5.000	-0.100	-0.085	-0.074	-0.063	-0.054	-0.044	-0.035	-0.026	-0.017	-0.009	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.239	0.247	0.259	0.284	0.345

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.895	0.968	0.990	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.995
0.040	0.873	0.955	0.983	0.993	0.997	0.998	0.999	1.000	1.000	1.000	1.000	0.993
0.060	0.855	0.942	0.975	0.989	0.994	0.997	0.998	0.999	1.000	1.000	1.000	0.991
0.100	0.824	0.918	0.960	0.980	0.989	0.994	0.996	0.998	0.998	0.999	0.999	0.987
0.150	0.793	0.892	0.942	0.968	0.981	0.988	0.993	0.995	0.996	0.997	0.997	0.982
0.200	0.765	0.868	0.925	0.955	0.972	0.982	0.988	0.992	0.994	0.994	0.995	0.977
0.250	0.741	0.847	0.908	0.943	0.964	0.976	0.983	0.988	0.990	0.991	0.992	0.972
0.300	0.710	0.827	0.892	0.931	0.954	0.969	0.978	0.983	0.986	0.987	0.988	0.967
0.400	0.680	0.791	0.862	0.907	0.936	0.954	0.965	0.972	0.976	0.978	0.979	0.957
0.500	0.646	0.759	0.834	0.884	0.917	0.938	0.952	0.961	0.966	0.968	0.968	0.947
0.600	0.615	0.729	0.808	0.862	0.898	0.922	0.938	0.948	0.953	0.956	0.957	0.937
0.800	0.561	0.677	0.760	0.819	0.860	0.889	0.908	0.920	0.927	0.930	0.931	0.917
1.000	0.513	0.630	0.716	0.779	0.824	0.855	0.877	0.890	0.898	0.901	0.902	0.897
1.200	0.470	0.587	0.675	0.741	0.788	0.822	0.845	0.859	0.868	0.871	0.872	0.877
1.500	0.411	0.529	0.619	0.686	0.736	0.772	0.797	0.812	0.821	0.825	0.826	0.847
2.000	0.324	0.442	0.533	0.602	0.654	0.692	0.718	0.734	0.744	0.748	0.749	0.797
2.500	0.247	0.365	0.456	0.525	0.573	0.616	0.642	0.659	0.668	0.672	0.673	0.747
3.000	0.179	0.295	0.385	0.454	0.506	0.544	0.570	0.587	0.596	0.601	0.602	0.697
3.500	0.118	0.233	0.321	0.389	0.440	0.477	0.503	0.519	0.529	0.533	0.534	0.647
4.000	0.064	0.177	0.263	0.329	0.379	0.415	0.441	0.457	0.466	0.470	0.471	0.597
4.500	0.021	0.129	0.212	0.276	0.324	0.359	0.383	0.399	0.408	0.412	0.412	0.547

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.050	-0.025	-0.012	-0.005	-0.002	-0.001	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.055	-0.030	-0.017	-0.009	-0.005	-0.003	-0.001	-0.001	-0.000	0.000
0.060	-0.100	-0.059	-0.035	-0.020	-0.012	-0.007	-0.004	-0.003	-0.001	-0.001	0.000
0.100	-0.100	-0.065	-0.042	-0.027	-0.017	-0.011	-0.008	-0.005	-0.003	-0.001	0.000
0.150	-0.100	-0.070	-0.048	-0.032	-0.022	-0.016	-0.011	-0.007	-0.005	-0.002	0.000
0.200	-0.100	-0.073	-0.052	-0.037	-0.026	-0.019	-0.014	-0.009	-0.006	-0.003	0.000
0.250	-0.100	-0.075	-0.055	-0.041	-0.030	-0.022	-0.016	-0.011	-0.007	-0.003	0.000
0.300	-0.100	-0.077	-0.058	-0.044	-0.033	-0.024	-0.018	-0.013	-0.008	-0.004	0.000
0.400	-0.100	-0.079	-0.062	-0.048	-0.037	-0.028	-0.021	-0.015	-0.010	-0.005	0.000
0.500	-0.100	-0.081	-0.065	-0.051	-0.041	-0.032	-0.024	-0.017	-0.011	-0.006	0.000
0.600	-0.100	-0.082	-0.067	-0.054	-0.043	-0.034	-0.026	-0.019	-0.012	-0.006	0.000
0.800	-0.100	-0.084	-0.070	-0.058	-0.047	-0.038	-0.029	-0.022	-0.014	-0.007	0.000
1.000	-0.100	-0.085	-0.072	-0.060	-0.050	-0.040	-0.031	-0.023	-0.015	-0.007	0.000
1.200	-0.100	-0.086	-0.073	-0.062	-0.051	-0.042	-0.033	-0.024	-0.016	-0.008	0.000
1.500	-0.100	-0.086	-0.074	-0.063	-0.053	-0.043	-0.034	-0.025	-0.017	-0.008	0.000
2.000	-0.100	-0.087	-0.075	-0.064	-0.054	-0.045	-0.035	-0.026	-0.017	-0.009	0.000
2.500	-0.100	-0.087	-0.075	-0.065	-0.055	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
3.000	-0.100	-0.086	-0.075	-0.065	-0.055	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
3.500	-0.100	-0.086	-0.074	-0.064	-0.054	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
4.000	-0.100	-0.085	-0.074	-0.063	-0.054	-0.044	-0.035	-0.026	-0.017	-0.008	0.000
4.500	-0.100	-0.083	-0.072	-0.062	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TB)=	0.100	0.250	0.500	1.000	2.000
	0.358	0.368	0.384	0.420	0.507

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.866	0.960	0.988	0.996	0.999	0.999	1.000	1.000	1.000	1.000	1.000	0.994
0.040	0.844	0.947	0.980	0.992	0.997	0.998	0.999	1.000	1.000	1.000	1.000	0.992
0.060	0.825	0.934	0.973	0.988	0.994	0.997	0.998	0.999	1.000	1.000	1.000	0.990
0.100	0.793	0.910	0.959	0.979	0.989	0.994	0.996	0.998	0.999	0.999	0.999	0.986
0.150	0.759	0.882	0.940	0.968	0.982	0.989	0.993	0.995	0.997	0.997	0.998	0.981
0.200	0.729	0.858	0.923	0.956	0.974	0.984	0.989	0.992	0.994	0.995	0.995	0.976
0.250	0.703	0.835	0.906	0.944	0.965	0.978	0.985	0.989	0.991	0.992	0.993	0.971
0.300	0.679	0.813	0.889	0.932	0.957	0.971	0.980	0.985	0.988	0.989	0.989	0.966
0.400	0.636	0.775	0.858	0.908	0.939	0.957	0.969	0.976	0.979	0.981	0.981	0.956
0.500	0.599	0.740	0.829	0.885	0.920	0.943	0.957	0.965	0.970	0.972	0.972	0.946
0.600	0.565	0.708	0.802	0.863	0.902	0.927	0.944	0.953	0.959	0.961	0.962	0.936
0.800	0.505	0.651	0.751	0.819	0.865	0.896	0.916	0.928	0.935	0.938	0.939	0.916
1.000	0.453	0.601	0.705	0.778	0.829	0.864	0.886	0.901	0.908	0.912	0.913	0.896
1.200	0.407	0.555	0.663	0.739	0.794	0.831	0.856	0.872	0.880	0.884	0.885	0.876
1.500	0.344	0.494	0.604	0.684	0.742	0.783	0.810	0.827	0.837	0.841	0.842	0.846
2.000	0.254	0.404	0.516	0.599	0.661	0.704	0.734	0.753	0.763	0.767	0.768	0.796
2.500	0.176	0.325	0.438	0.522	0.585	0.629	0.660	0.679	0.690	0.694	0.695	0.746
3.000	0.109	0.257	0.368	0.451	0.514	0.559	0.589	0.609	0.619	0.624	0.625	0.696
3.500	0.053	0.196	0.305	0.387	0.448	0.493	0.523	0.542	0.553	0.557	0.558	0.645

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.050	-0.025	-0.012	-0.006	-0.002	-0.001	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.054	-0.030	-0.016	-0.009	-0.005	-0.003	-0.001	-0.001	-0.000	0.000
0.060	-0.100	-0.058	-0.033	-0.019	-0.012	-0.007	-0.004	-0.002	-0.001	-0.001	0.000
0.100	-0.100	-0.063	-0.039	-0.025	-0.016	-0.010	-0.007	-0.004	-0.003	-0.001	0.000
0.150	-0.100	-0.067	-0.044	-0.030	-0.020	-0.014	-0.010	-0.006	-0.004	-0.002	0.000
0.200	-0.100	-0.070	-0.049	-0.034	-0.024	-0.017	-0.012	-0.008	-0.005	-0.002	0.000
0.250	-0.100	-0.072	-0.052	-0.037	-0.027	-0.019	-0.014	-0.010	-0.006	-0.003	0.000
0.300	-0.100	-0.074	-0.054	-0.040	-0.029	-0.022	-0.016	-0.011	-0.007	-0.003	0.000
0.400	-0.100	-0.077	-0.058	-0.044	-0.034	-0.025	-0.019	-0.013	-0.009	-0.004	0.000
0.500	-0.100	-0.079	-0.061	-0.048	-0.037	-0.028	-0.021	-0.015	-0.010	-0.005	0.000
0.600	-0.100	-0.080	-0.064	-0.050	-0.040	-0.031	-0.023	-0.017	-0.011	-0.005	0.000
0.800	-0.100	-0.082	-0.067	-0.054	-0.043	-0.034	-0.027	-0.019	-0.013	-0.006	0.000
1.000	-0.100	-0.083	-0.069	-0.057	-0.046	-0.037	-0.029	-0.021	-0.014	-0.007	0.000
1.200	-0.100	-0.084	-0.070	-0.059	-0.048	-0.039	-0.030	-0.022	-0.015	-0.007	0.000
1.500	-0.100	-0.085	-0.072	-0.060	-0.050	-0.041	-0.032	-0.024	-0.016	-0.008	0.000
2.000	-0.100	-0.085	-0.073	-0.062	-0.052	-0.043	-0.034	-0.025	-0.016	-0.008	0.000
2.500	-0.100	-0.085	-0.073	-0.063	-0.053	-0.043	-0.034	-0.026	-0.017	-0.008	0.000
3.000	-0.100	-0.085	-0.073	-0.063	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000
3.500	-0.100	-0.084	-0.072	-0.062	-0.053	-0.043	-0.034	-0.026	-0.017	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.478	0.489	0.508	0.552	0.659

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.836	0.952	0.985	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.993
0.040	0.815	0.939	0.978	0.992	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.991
0.060	0.796	0.926	0.971	0.988	0.994	0.997	0.998	0.999	1.000	1.000	1.000	0.989
0.100	0.762	0.902	0.957	0.979	0.989	0.994	0.997	0.998	0.999	0.999	0.999	0.985
0.150	0.727	0.874	0.939	0.968	0.982	0.990	0.993	0.996	0.997	0.998	0.998	0.980
0.200	0.695	0.848	0.921	0.957	0.975	0.984	0.990	0.993	0.995	0.995	0.996	0.975
0.250	0.667	0.824	0.904	0.945	0.967	0.979	0.986	0.990	0.992	0.993	0.993	0.970
0.300	0.642	0.802	0.887	0.933	0.958	0.973	0.981	0.986	0.989	0.990	0.990	0.965
0.400	0.596	0.761	0.855	0.910	0.941	0.960	0.971	0.978	0.981	0.983	0.983	0.955
0.500	0.556	0.724	0.826	0.887	0.923	0.946	0.960	0.968	0.973	0.975	0.975	0.945
0.600	0.519	0.690	0.797	0.864	0.906	0.932	0.948	0.958	0.963	0.965	0.966	0.935
0.800	0.455	0.630	0.745	0.820	0.870	0.902	0.922	0.934	0.941	0.944	0.944	0.915
1.000	0.400	0.577	0.697	0.779	0.834	0.871	0.894	0.909	0.917	0.920	0.921	0.895
1.200	0.351	0.529	0.653	0.740	0.799	0.839	0.866	0.882	0.891	0.894	0.895	0.875
1.500	0.285	0.465	0.595	0.684	0.748	0.792	0.822	0.840	0.850	0.854	0.855	0.845
2.000	0.192	0.372	0.503	0.598	0.667	0.716	0.748	0.768	0.779	0.784	0.785	0.795
2.500	0.115	0.293	0.424	0.521	0.592	0.642	0.676	0.697	0.709	0.713	0.714	0.745
3.000	0.052	0.226	0.355	0.451	0.522	0.573	0.607	0.628	0.640	0.645	0.646	0.694

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.050	-0.026	-0.013	-0.006	-0.003	-0.001	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.054	-0.029	-0.016	-0.009	-0.005	-0.003	-0.001	-0.001	-0.000	0.000
0.060	-0.100	-0.057	-0.032	-0.019	-0.011	-0.007	-0.004	-0.002	-0.001	-0.001	0.000
0.100	-0.100	-0.061	-0.037	-0.023	-0.015	-0.010	-0.006	-0.004	-0.002	-0.001	0.000
0.150	-0.100	-0.065	-0.042	-0.028	-0.019	-0.013	-0.009	-0.006	-0.004	-0.002	0.000
0.200	-0.100	-0.068	-0.046	-0.031	-0.022	-0.015	-0.011	-0.007	-0.005	-0.002	0.000
0.250	-0.100	-0.070	-0.049	-0.034	-0.024	-0.018	-0.013	-0.009	-0.006	-0.003	0.000
0.300	-0.100	-0.072	-0.052	-0.037	-0.027	-0.020	-0.014	-0.010	-0.006	-0.003	0.000
0.400	-0.100	-0.075	-0.055	-0.041	-0.031	-0.023	-0.017	-0.012	-0.008	-0.004	0.000
0.500	-0.100	-0.077	-0.058	-0.045	-0.034	-0.026	-0.019	-0.014	-0.009	-0.004	0.000
0.600	-0.100	-0.078	-0.061	-0.047	-0.037	-0.028	-0.021	-0.015	-0.010	-0.005	0.000
0.800	-0.100	-0.080	-0.064	-0.051	-0.041	-0.032	-0.024	-0.018	-0.012	-0.006	0.000
1.000	-0.100	-0.081	-0.066	-0.054	-0.043	-0.034	-0.027	-0.019	-0.013	-0.006	0.000
1.200	-0.100	-0.082	-0.068	-0.056	-0.045	-0.036	-0.028	-0.021	-0.014	-0.007	0.000
1.500	-0.100	-0.083	-0.070	-0.058	-0.048	-0.039	-0.030	-0.022	-0.015	-0.007	0.000
2.000	-0.100	-0.084	-0.071	-0.060	-0.050	-0.041	-0.032	-0.024	-0.016	-0.008	0.000
2.500	-0.100	-0.084	-0.071	-0.061	-0.051	-0.042	-0.033	-0.024	-0.016	-0.008	0.000
3.000	-0.100	-0.083	-0.071	-0.061	-0.051	-0.042	-0.033	-0.025	-0.016	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.600	0.612	0.634	0.684	0.806

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 0.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.984	0.993	0.997	0.999	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.999
0.040	0.966	0.980	0.989	0.994	0.997	0.998	0.999	1.000	1.000	1.000	1.000	0.997
0.060	0.958	0.970	0.980	0.987	0.992	0.996	0.998	0.999	0.999	1.000	1.000	0.995
0.100	0.943	0.956	0.967	0.976	0.983	0.988	0.992	0.995	0.996	0.997	0.998	0.991
0.150	0.930	0.942	0.954	0.964	0.972	0.978	0.983	0.987	0.990	0.991	0.992	0.986
0.200	0.917	0.931	0.943	0.953	0.961	0.968	0.974	0.979	0.982	0.984	0.984	0.981
0.250	0.907	0.920	0.932	0.942	0.951	0.959	0.965	0.969	0.973	0.975	0.975	0.976
0.300	0.896	0.910	0.922	0.932	0.941	0.949	0.955	0.960	0.963	0.965	0.966	0.971
0.400	0.877	0.890	0.902	0.913	0.922	0.930	0.936	0.941	0.944	0.946	0.947	0.961
0.500	0.858	0.871	0.883	0.894	0.903	0.911	0.917	0.922	0.925	0.927	0.928	0.951
0.600	0.840	0.853	0.864	0.875	0.884	0.892	0.898	0.903	0.906	0.908	0.909	0.941
0.800	0.802	0.816	0.827	0.838	0.847	0.854	0.861	0.865	0.869	0.871	0.872	0.921
1.000	0.767	0.779	0.791	0.801	0.810	0.818	0.824	0.829	0.832	0.834	0.835	0.901
1.200	0.731	0.744	0.756	0.766	0.775	0.782	0.788	0.793	0.797	0.799	0.799	0.881
1.500	0.680	0.693	0.704	0.714	0.723	0.731	0.737	0.741	0.745	0.747	0.747	0.851
2.000	0.598	0.611	0.622	0.632	0.641	0.648	0.654	0.659	0.662	0.664	0.665	0.801
2.500	0.522	0.534	0.545	0.555	0.563	0.570	0.576	0.581	0.584	0.586	0.587	0.752
3.000	0.451	0.463	0.473	0.483	0.491	0.498	0.504	0.508	0.511	0.513	0.514	0.702
3.500	0.384	0.396	0.406	0.415	0.423	0.430	0.436	0.440	0.443	0.445	0.446	0.652
4.000	0.323	0.334	0.344	0.353	0.361	0.367	0.373	0.377	0.380	0.382	0.382	0.602
4.500	0.267	0.278	0.287	0.296	0.303	0.310	0.315	0.319	0.322	0.323	0.324	0.552
5.000	0.216	0.226	0.236	0.244	0.251	0.257	0.262	0.266	0.268	0.270	0.271	0.502
5.500	0.170	0.180	0.189	0.197	0.203	0.209	0.214	0.217	0.220	0.222	0.222	0.452
6.000	0.130	0.139	0.147	0.154	0.161	0.166	0.171	0.174	0.177	0.178	0.179	0.402
6.500	0.095	0.103	0.110	0.117	0.123	0.128	0.132	0.136	0.138	0.139	0.140	0.352
7.000	0.065	0.072	0.079	0.085	0.091	0.095	0.099	0.102	0.104	0.106	0.106	0.302
8.000	0.022	0.027	0.032	0.036	0.041	0.044	0.047	0.050	0.051	0.052	0.053	0.203

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 0.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.042	-0.018	-0.007	-0.002	0.0	0.0	0.001	0.001	0.000	0.000
0.040	-0.100	-0.077	-0.048	-0.027	-0.014	-0.007	-0.004	-0.001	0.0	0.001	0.000
0.060	-0.100	-0.075	-0.060	-0.042	-0.027	-0.017	-0.010	-0.005	-0.001	0.0	0.000
0.100	-0.100	-0.085	-0.067	-0.054	-0.042	-0.031	-0.021	-0.014	-0.008	-0.004	0.000
0.150	-0.100	-0.085	-0.074	-0.062	-0.050	-0.039	-0.030	-0.021	-0.014	-0.006	0.000
0.200	-0.100	-0.088	-0.076	-0.065	-0.055	-0.044	-0.035	-0.025	-0.017	-0.007	0.000
0.250	-0.100	-0.088	-0.077	-0.068	-0.056	-0.046	-0.037	-0.027	-0.018	-0.008	0.000
0.300	-0.100	-0.089	-0.077	-0.068	-0.058	-0.048	-0.038	-0.027	-0.018	-0.008	0.000
0.400	-0.100	-0.088	-0.080	-0.068	-0.058	-0.049	-0.038	-0.029	-0.019	-0.010	0.000
0.500	-0.100	-0.089	-0.079	-0.069	-0.058	-0.049	-0.039	-0.029	-0.019	-0.008	0.000
0.600	-0.100	-0.089	-0.079	-0.069	-0.058	-0.049	-0.038	-0.029	-0.019	-0.010	0.000
0.800	-0.100	-0.089	-0.079	-0.069	-0.058	-0.049	-0.039	-0.029	-0.019	-0.010	0.000
1.000	-0.100	-0.088	-0.079	-0.069	-0.058	-0.049	-0.038	-0.029	-0.019	-0.010	0.000
1.200	-0.100	-0.089	-0.079	-0.068	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
1.500	-0.100	-0.088	-0.080	-0.069	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
2.000	-0.100	-0.089	-0.079	-0.069	-0.058	-0.049	-0.038	-0.029	-0.019	-0.010	0.000
2.500	-0.100	-0.088	-0.080	-0.069	-0.058	-0.048	-0.038	-0.029	-0.019	-0.008	0.000
3.000	-0.100	-0.089	-0.079	-0.069	-0.058	-0.049	-0.039	-0.029	-0.019	-0.008	0.000
3.500	-0.100	-0.089	-0.079	-0.069	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
4.000	-0.100	-0.089	-0.079	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.010	0.000
4.500	-0.100	-0.089	-0.079	-0.068	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
5.000	-0.100	-0.088	-0.077	-0.068	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
5.500	-0.100	-0.088	-0.079	-0.068	-0.058	-0.049	-0.038	-0.029	-0.019	-0.008	0.000
6.000	-0.100	-0.090	-0.079	-0.069	-0.058	-0.048	-0.038	-0.029	-0.018	-0.008	0.000
6.500	-0.100	-0.089	-0.080	-0.069	-0.059	-0.049	-0.039	-0.029	-0.019	-0.010	0.000
7.000	-0.100	-0.089	-0.079	-0.069	-0.059	-0.049	-0.039	-0.029	-0.019	-0.010	0.000
8.000	-0.100	-0.089	-0.080	-0.069	-0.058	-0.049	-0.039	-0.029	-0.019	-0.010	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.003	0.005	0.009	0.019	0.059

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.952	0.983	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.998
0.040	0.933	0.970	0.986	0.993	0.997	0.998	0.999	1.000	1.000	1.000	1.000	0.996
0.060	0.918	0.953	0.978	0.988	0.994	0.996	0.998	0.999	0.999	1.000	1.000	0.994
0.100	0.895	0.938	0.963	0.978	0.986	0.991	0.995	0.996	0.998	0.998	0.998	0.990
0.150	0.873	0.917	0.946	0.965	0.976	0.984	0.989	0.992	0.994	0.995	0.995	0.985
0.200	0.853	0.899	0.931	0.952	0.965	0.976	0.982	0.987	0.989	0.990	0.991	0.980
0.250	0.837	0.883	0.916	0.940	0.956	0.968	0.975	0.980	0.983	0.985	0.985	0.975
0.300	0.822	0.868	0.903	0.928	0.946	0.959	0.968	0.973	0.977	0.979	0.979	0.970
0.400	0.795	0.842	0.878	0.906	0.926	0.941	0.951	0.958	0.962	0.965	0.965	0.960
0.500	0.770	0.818	0.856	0.885	0.907	0.923	0.934	0.942	0.946	0.949	0.950	0.950
0.600	0.748	0.796	0.835	0.865	0.887	0.904	0.916	0.925	0.930	0.932	0.933	0.940
0.800	0.707	0.756	0.795	0.826	0.850	0.868	0.881	0.890	0.895	0.898	0.898	0.920
1.000	0.670	0.718	0.757	0.789	0.813	0.832	0.845	0.854	0.860	0.862	0.863	0.900
1.200	0.633	0.682	0.721	0.753	0.778	0.796	0.810	0.819	0.825	0.827	0.828	0.879
1.500	0.582	0.630	0.669	0.701	0.726	0.744	0.758	0.767	0.773	0.776	0.776	0.849
2.000	0.500	0.548	0.587	0.619	0.643	0.662	0.675	0.684	0.690	0.693	0.693	0.799
2.500	0.425	0.472	0.511	0.542	0.566	0.584	0.597	0.606	0.612	0.615	0.615	0.749
3.000	0.354	0.401	0.439	0.470	0.494	0.512	0.525	0.534	0.539	0.542	0.542	0.699
3.500	0.288	0.335	0.373	0.403	0.426	0.444	0.457	0.466	0.471	0.473	0.474	0.649
4.000	0.228	0.274	0.312	0.341	0.364	0.381	0.394	0.402	0.408	0.410	0.411	0.599
4.500	0.174	0.219	0.256	0.284	0.307	0.324	0.336	0.344	0.349	0.352	0.353	0.549
5.000	0.125	0.169	0.205	0.233	0.255	0.271	0.283	0.291	0.296	0.298	0.299	0.499
5.500	0.082	0.125	0.159	0.187	0.208	0.224	0.235	0.243	0.248	0.250	0.251	0.449
6.000	0.045	0.087	0.120	0.146	0.166	0.182	0.192	0.200	0.204	0.206	0.207	0.399
6.500	0.015	0.055	0.086	0.111	0.130	0.144	0.155	0.161	0.166	0.168	0.168	0.349

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.050	-0.025	-0.012	-0.005	-0.002	-0.001	-0.000	-0.000	0.000	0.000
0.040	-0.100	-0.062	-0.036	-0.021	-0.012	-0.007	-0.004	-0.002	-0.001	-0.000	0.000
0.060	-0.100	-0.068	-0.044	-0.028	-0.018	-0.011	-0.007	-0.004	-0.002	-0.001	0.000
0.100	-0.100	-0.074	-0.053	-0.038	-0.026	-0.018	-0.012	-0.008	-0.005	-0.002	0.000
0.150	-0.100	-0.079	-0.060	-0.045	-0.034	-0.025	-0.018	-0.013	-0.008	-0.004	0.000
0.200	-0.100	-0.081	-0.065	-0.051	-0.039	-0.030	-0.022	-0.016	-0.010	-0.005	0.000
0.250	-0.100	-0.083	-0.068	-0.054	-0.043	-0.034	-0.026	-0.018	-0.012	-0.006	0.000
0.300	-0.100	-0.084	-0.070	-0.057	-0.046	-0.037	-0.028	-0.020	-0.013	-0.007	0.000
0.400	-0.100	-0.086	-0.073	-0.061	-0.050	-0.041	-0.032	-0.023	-0.015	-0.008	0.000
0.500	-0.100	-0.087	-0.075	-0.064	-0.053	-0.043	-0.034	-0.025	-0.017	-0.008	0.000
0.600	-0.100	-0.088	-0.076	-0.065	-0.055	-0.045	-0.035	-0.026	-0.017	-0.009	0.000
0.800	-0.100	-0.089	-0.078	-0.067	-0.057	-0.047	-0.037	-0.028	-0.018	-0.009	0.000
1.000	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.028	-0.019	-0.009	0.000
1.200	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
1.500	-0.100	-0.089	-0.079	-0.068	-0.058	-0.048	-0.039	-0.029	-0.019	-0.009	0.000
2.000	-0.100	-0.089	-0.079	-0.068	-0.058	-0.048	-0.039	-0.029	-0.019	-0.009	0.000
2.500	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
3.000	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
3.500	-0.100	-0.089	-0.078	-0.068	-0.058	-0.048	-0.038	-0.029	-0.019	-0.009	0.000
4.000	-0.100	-0.088	-0.078	-0.067	-0.057	-0.048	-0.038	-0.028	-0.019	-0.009	0.000
4.500	-0.100	-0.088	-0.077	-0.067	-0.057	-0.047	-0.038	-0.028	-0.019	-0.009	0.000
5.000	-0.100	-0.088	-0.077	-0.066	-0.056	-0.047	-0.037	-0.028	-0.018	-0.009	0.000
5.500	-0.100	-0.087	-0.076	-0.066	-0.056	-0.046	-0.037	-0.027	-0.018	-0.009	0.000
6.000	-0.100	-0.086	-0.075	-0.065	-0.055	-0.046	-0.036	-0.027	-0.018	-0.009	0.000
6.500	-0.100	-0.085	-0.074	-0.063	-0.054	-0.045	-0.035	-0.026	-0.018	-0.009	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.141	0.147	0.153	0.166	0.199

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.920	0.974	0.991	0.997	0.999	0.999	1.000	1.000	1.000	1.000	1.000	0.996
0.040	0.900	0.960	0.983	0.992	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.994
0.060	0.884	0.948	0.976	0.988	0.994	0.997	0.998	0.999	0.999	1.000	1.000	0.992
0.100	0.857	0.926	0.961	0.978	0.987	0.992	0.995	0.997	0.998	0.998	0.999	0.988
0.150	0.830	0.902	0.943	0.966	0.979	0.986	0.991	0.994	0.995	0.996	0.996	0.983
0.200	0.806	0.881	0.926	0.953	0.969	0.979	0.986	0.989	0.991	0.993	0.993	0.978
0.250	0.786	0.862	0.910	0.941	0.960	0.972	0.980	0.984	0.987	0.988	0.989	0.973
0.300	0.767	0.844	0.895	0.929	0.950	0.964	0.973	0.979	0.982	0.984	0.984	0.968
0.400	0.733	0.812	0.867	0.905	0.931	0.948	0.959	0.966	0.970	0.972	0.973	0.958
0.500	0.704	0.784	0.842	0.883	0.911	0.931	0.944	0.952	0.957	0.960	0.960	0.948
0.600	0.677	0.758	0.818	0.861	0.892	0.914	0.928	0.938	0.943	0.946	0.946	0.938
0.800	0.630	0.711	0.774	0.820	0.854	0.879	0.895	0.906	0.912	0.915	0.916	0.918
1.000	0.587	0.669	0.733	0.782	0.818	0.844	0.862	0.873	0.880	0.883	0.884	0.898
1.200	0.548	0.630	0.695	0.745	0.782	0.809	0.828	0.840	0.847	0.850	0.851	0.878
1.500	0.493	0.576	0.641	0.692	0.730	0.758	0.777	0.790	0.798	0.801	0.802	0.848
2.000	0.410	0.493	0.558	0.609	0.648	0.676	0.696	0.709	0.716	0.720	0.721	0.798
2.500	0.334	0.416	0.461	0.532	0.570	0.599	0.619	0.632	0.639	0.642	0.643	0.748
3.000	0.265	0.346	0.410	0.460	0.499	0.527	0.546	0.559	0.566	0.570	0.570	0.698
3.500	0.202	0.282	0.345	0.394	0.432	0.459	0.478	0.491	0.498	0.501	0.502	0.647
4.000	0.144	0.223	0.285	0.333	0.370	0.397	0.416	0.428	0.435	0.438	0.439	0.597
4.500	0.093	0.171	0.231	0.278	0.314	0.340	0.358	0.370	0.377	0.380	0.380	0.547
5.000	0.049	0.124	0.183	0.228	0.262	0.288	0.305	0.317	0.323	0.326	0.327	0.497
5.500	0.013	0.085	0.141	0.184	0.216	0.241	0.257	0.268	0.275	0.277	0.278	0.447

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.052	-0.027	-0.013	-0.006	-0.003	-0.001	-0.001	-0.000	-0.000	0.000
0.040	-0.100	-0.059	-0.034	-0.019	-0.011	-0.006	-0.004	-0.002	-0.001	-0.000	0.000
0.060	-0.100	-0.063	-0.039	-0.024	-0.015	-0.009	-0.006	-0.004	-0.002	-0.001	0.000
0.100	-0.100	-0.069	-0.047	-0.031	-0.021	-0.014	-0.010	-0.006	-0.004	-0.002	0.000
0.150	-0.100	-0.074	-0.053	-0.038	-0.027	-0.020	-0.014	-0.010	-0.006	-0.003	0.000
0.200	-0.100	-0.077	-0.058	-0.043	-0.032	-0.024	-0.017	-0.012	-0.008	-0.004	0.000
0.250	-0.100	-0.079	-0.061	-0.047	-0.035	-0.027	-0.020	-0.014	-0.009	-0.004	0.000
0.300	-0.100	-0.080	-0.063	-0.050	-0.038	-0.030	-0.022	-0.016	-0.010	-0.005	0.000
0.400	-0.100	-0.082	-0.067	-0.054	-0.043	-0.034	-0.026	-0.019	-0.012	-0.006	0.000
0.500	-0.100	-0.084	-0.070	-0.057	-0.046	-0.037	-0.028	-0.021	-0.014	-0.007	0.000
0.600	-0.100	-0.085	-0.071	-0.059	-0.049	-0.039	-0.030	-0.022	-0.015	-0.007	0.000
0.800	-0.100	-0.086	-0.074	-0.062	-0.052	-0.042	-0.033	-0.025	-0.016	-0.008	0.000
1.000	-0.100	-0.087	-0.075	-0.064	-0.054	-0.044	-0.035	-0.026	-0.017	-0.008	0.000
1.200	-0.100	-0.088	-0.076	-0.065	-0.055	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
1.500	-0.100	-0.088	-0.077	-0.066	-0.056	-0.046	-0.037	-0.027	-0.018	-0.009	0.000
2.000	-0.100	-0.088	-0.077	-0.067	-0.057	-0.047	-0.037	-0.028	-0.018	-0.009	0.000
2.500	-0.100	-0.088	-0.077	-0.067	-0.057	-0.047	-0.037	-0.028	-0.018	-0.009	0.000
3.000	-0.100	-0.088	-0.077	-0.066	-0.057	-0.047	-0.037	-0.028	-0.018	-0.009	0.000
3.500	-0.100	-0.087	-0.076	-0.066	-0.056	-0.046	-0.037	-0.028	-0.018	-0.009	0.000
4.000	-0.100	-0.087	-0.076	-0.065	-0.056	-0.046	-0.037	-0.027	-0.018	-0.009	0.000
4.500	-0.100	-0.086	-0.075	-0.065	-0.055	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
5.000	-0.100	-0.085	-0.074	-0.064	-0.054	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
5.500	-0.100	-0.084	-0.072	-0.062	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.280	0.289	0.302	0.332	0.404

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.889	0.964	0.988	0.996	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.995
0.040	0.868	0.951	0.980	0.992	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.993
0.060	0.851	0.938	0.973	0.987	0.994	0.997	0.998	0.999	0.999	1.000	1.000	0.991
0.100	0.822	0.915	0.958	0.978	0.988	0.993	0.996	0.997	0.998	0.999	0.999	0.987
0.150	0.791	0.890	0.940	0.966	0.980	0.987	0.992	0.994	0.996	0.996	0.997	0.982
0.200	0.765	0.866	0.925	0.954	0.971	0.981	0.987	0.991	0.993	0.994	0.994	0.977
0.250	0.742	0.845	0.906	0.942	0.962	0.975	0.982	0.986	0.989	0.990	0.990	0.972
0.300	0.720	0.826	0.890	0.929	0.953	0.967	0.976	0.982	0.985	0.986	0.986	0.967
0.400	0.682	0.791	0.861	0.906	0.934	0.952	0.964	0.971	0.975	0.977	0.977	0.957
0.500	0.648	0.759	0.833	0.883	0.915	0.937	0.950	0.959	0.964	0.966	0.966	0.947
0.600	0.618	0.730	0.807	0.861	0.896	0.920	0.936	0.946	0.951	0.954	0.954	0.937
0.800	0.564	0.678	0.760	0.818	0.859	0.887	0.906	0.917	0.924	0.927	0.928	0.917
1.000	0.517	0.632	0.716	0.778	0.823	0.854	0.874	0.887	0.895	0.898	0.899	0.897
1.200	0.474	0.590	0.676	0.740	0.787	0.820	0.842	0.356	0.864	0.868	0.868	0.877
1.500	0.416	0.532	0.620	0.686	0.735	0.770	0.794	0.809	0.817	0.821	0.822	0.846
2.000	0.329	0.445	0.534	0.602	0.653	0.690	0.715	0.730	0.739	0.743	0.744	0.796
2.500	0.253	0.368	0.457	0.525	0.576	0.613	0.639	0.655	0.664	0.668	0.668	0.746
3.000	0.185	0.299	0.387	0.454	0.505	0.541	0.567	0.583	0.592	0.596	0.596	0.696
3.500	0.124	0.236	0.323	0.389	0.439	0.475	0.499	0.515	0.524	0.528	0.529	0.646
4.000	0.071	0.181	0.265	0.329	0.378	0.413	0.437	0.452	0.461	0.465	0.465	0.596
4.500	0.026	0.132	0.213	0.275	0.322	0.356	0.380	0.394	0.403	0.406	0.407	0.546

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.053	-0.028	-0.014	-0.007	-0.003	-0.001	-0.001	-0.000	-0.000	0.000
0.040	-0.100	-0.057	-0.033	-0.019	-0.011	-0.006	-0.004	-0.002	-0.001	-0.000	0.000
0.060	-0.100	-0.061	-0.037	-0.022	-0.014	-0.009	-0.005	-0.003	-0.002	-0.001	0.000
0.100	-0.100	-0.066	-0.043	-0.028	-0.019	-0.013	-0.008	-0.006	-0.003	-0.002	0.000
0.150	-0.100	-0.071	-0.049	-0.034	-0.024	-0.017	-0.012	-0.008	-0.005	-0.002	0.000
0.200	-0.100	-0.075	-0.053	-0.038	-0.028	-0.020	-0.014	-0.010	-0.006	-0.003	0.000
0.250	-0.100	-0.076	-0.056	-0.042	-0.031	-0.023	-0.017	-0.012	-0.008	-0.004	0.000
0.300	-0.100	-0.077	-0.059	-0.044	-0.034	-0.025	-0.019	-0.013	-0.009	-0.004	0.000
0.400	-0.100	-0.080	-0.063	-0.049	-0.038	-0.029	-0.022	-0.016	-0.010	-0.005	0.000
0.500	-0.100	-0.081	-0.065	-0.052	-0.041	-0.032	-0.025	-0.018	-0.012	-0.006	0.000
0.600	-0.100	-0.082	-0.067	-0.055	-0.044	-0.035	-0.027	-0.019	-0.013	-0.006	0.000
0.800	-0.100	-0.084	-0.070	-0.058	-0.048	-0.038	-0.030	-0.022	-0.014	-0.007	0.000
1.000	-0.100	-0.085	-0.072	-0.061	-0.050	-0.041	-0.032	-0.023	-0.015	-0.008	0.000
1.200	-0.100	-0.086	-0.073	-0.062	-0.052	-0.042	-0.033	-0.025	-0.016	-0.008	0.000
1.500	-0.100	-0.086	-0.075	-0.064	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000
2.000	-0.100	-0.087	-0.075	-0.065	-0.055	-0.045	-0.036	-0.027	-0.017	-0.009	0.000
2.500	-0.100	-0.087	-0.075	-0.065	-0.055	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
3.000	-0.100	-0.087	-0.075	-0.065	-0.055	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
3.500	-0.100	-0.086	-0.075	-0.064	-0.055	-0.045	-0.036	-0.027	-0.018	-0.009	0.000
4.000	-0.100	-0.085	-0.074	-0.064	-0.054	-0.045	-0.035	-0.026	-0.017	-0.008	0.000
4.500	-0.100	-0.084	-0.073	-0.063	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.420	0.431	0.449	0.491	0.594

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME	DISTANCE(X)=											PMEAN
(TO)	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	(PM)
0.020	0.857	0.954	0.985	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.993
0.040	0.836	0.941	0.977	0.991	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.991
0.060	0.819	0.929	0.970	0.986	0.993	0.997	0.998	0.999	0.999	1.000	1.000	0.989
0.100	0.788	0.905	0.955	0.978	0.988	0.993	0.996	0.997	0.998	0.999	0.999	0.985
0.150	0.756	0.879	0.937	0.965	0.980	0.988	0.992	0.995	0.996	0.997	0.997	0.980
0.200	0.727	0.854	0.920	0.954	0.972	0.982	0.988	0.992	0.993	0.994	0.995	0.975
0.250	0.701	0.832	0.903	0.942	0.964	0.976	0.984	0.988	0.990	0.991	0.992	0.970
0.300	0.678	0.811	0.887	0.930	0.955	0.970	0.979	0.984	0.986	0.988	0.988	0.965
0.400	0.636	0.773	0.856	0.906	0.937	0.956	0.967	0.974	0.978	0.979	0.980	0.955
0.500	0.600	0.739	0.827	0.883	0.919	0.941	0.955	0.963	0.968	0.970	0.970	0.945
0.600	0.566	0.707	0.800	0.861	0.900	0.926	0.942	0.951	0.957	0.959	0.960	0.935
0.800	0.507	0.651	0.750	0.818	0.864	0.894	0.914	0.926	0.932	0.935	0.936	0.915
1.000	0.456	0.602	0.705	0.777	0.827	0.862	0.884	0.898	0.905	0.909	0.909	0.895
1.200	0.410	0.557	0.662	0.733	0.792	0.829	0.854	0.869	0.877	0.881	0.881	0.875
1.500	0.348	0.495	0.604	0.683	0.741	0.781	0.807	0.824	0.833	0.837	0.838	0.845
2.000	0.258	0.406	0.516	0.599	0.659	0.702	0.731	0.749	0.759	0.763	0.764	0.795
2.500	0.181	0.323	0.438	0.522	0.583	0.627	0.656	0.675	0.685	0.690	0.690	0.745
3.000	0.115	0.259	0.368	0.451	0.512	0.556	0.586	0.604	0.615	0.619	0.620	0.695
3.500	0.058	0.199	0.306	0.387	0.447	0.490	0.519	0.538	0.548	0.552	0.553	0.644

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.053	-0.028	-0.015	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000	0.000
0.040	-0.100	-0.057	-0.032	-0.013	-0.010	-0.006	-0.003	-0.002	-0.001	-0.000	0.000
0.060	-0.100	-0.060	-0.035	-0.021	-0.013	-0.008	-0.005	-0.003	-0.002	-0.001	0.000
0.100	-0.100	-0.064	-0.041	-0.026	-0.017	-0.011	-0.008	-0.005	-0.003	-0.001	0.000
0.150	-0.100	-0.068	-0.046	-0.031	-0.021	-0.015	-0.010	-0.007	-0.004	-0.002	0.000
0.200	-0.100	-0.071	-0.050	-0.035	-0.025	-0.013	-0.013	-0.009	-0.006	-0.003	0.000
0.250	-0.100	-0.073	-0.053	-0.033	-0.028	-0.020	-0.015	-0.010	-0.007	-0.003	0.000
0.300	-0.100	-0.075	-0.055	-0.041	-0.030	-0.022	-0.016	-0.012	-0.007	-0.004	0.000
0.400	-0.100	-0.077	-0.059	-0.045	-0.034	-0.026	-0.019	-0.014	-0.009	-0.004	0.000
0.500	-0.100	-0.079	-0.062	-0.048	-0.038	-0.029	-0.022	-0.016	-0.010	-0.005	0.000
0.600	-0.100	-0.080	-0.064	-0.051	-0.040	-0.031	-0.024	-0.017	-0.011	-0.005	0.000
0.800	-0.100	-0.082	-0.067	-0.055	-0.044	-0.035	-0.027	-0.020	-0.013	-0.006	0.000
1.000	-0.100	-0.083	-0.069	-0.057	-0.047	-0.037	-0.029	-0.021	-0.014	-0.007	0.000
1.200	-0.100	-0.084	-0.071	-0.059	-0.049	-0.039	-0.031	-0.023	-0.015	-0.007	0.000
1.500	-0.100	-0.085	-0.072	-0.061	-0.051	-0.041	-0.032	-0.024	-0.016	-0.008	0.000
2.000	-0.100	-0.085	-0.073	-0.062	-0.052	-0.043	-0.034	-0.025	-0.017	-0.008	0.000
2.500	-0.100	-0.085	-0.074	-0.063	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000
3.000	-0.100	-0.085	-0.073	-0.063	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000
3.500	-0.100	-0.084	-0.073	-0.062	-0.053	-0.044	-0.035	-0.026	-0.017	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TC)=	0.100	0.250	0.500	1.000	2.000
	0.562	0.574	0.596	0.647	0.774

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.020	0.825	0.944	0.982	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.992
0.040	0.805	0.931	0.974	0.990	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.990
0.060	0.787	0.919	0.967	0.986	0.993	0.997	0.998	0.999	0.999	1.000	1.000	0.988
0.100	0.755	0.895	0.953	0.977	0.988	0.993	0.996	0.998	0.998	0.999	0.999	0.984
0.150	0.721	0.868	0.935	0.966	0.981	0.988	0.993	0.995	0.996	0.997	0.997	0.979
0.200	0.691	0.843	0.917	0.954	0.973	0.983	0.989	0.992	0.994	0.995	0.995	0.974
0.250	0.664	0.820	0.900	0.942	0.965	0.977	0.985	0.989	0.991	0.992	0.992	0.969
0.300	0.639	0.798	0.884	0.931	0.957	0.971	0.980	0.985	0.988	0.989	0.989	0.964
0.400	0.594	0.755	0.853	0.907	0.939	0.958	0.970	0.976	0.980	0.981	0.982	0.954
0.500	0.555	0.722	0.823	0.884	0.921	0.944	0.958	0.966	0.971	0.973	0.973	0.944
0.600	0.519	0.689	0.795	0.852	0.904	0.930	0.946	0.956	0.961	0.963	0.964	0.934
0.800	0.456	0.629	0.743	0.818	0.868	0.899	0.920	0.932	0.938	0.941	0.942	0.914
1.000	0.402	0.577	0.696	0.777	0.832	0.868	0.892	0.906	0.914	0.917	0.918	0.894
1.200	0.353	0.529	0.652	0.738	0.797	0.837	0.863	0.879	0.887	0.891	0.892	0.874
1.500	0.288	0.465	0.592	0.682	0.746	0.790	0.819	0.836	0.846	0.850	0.851	0.844
2.000	0.196	0.373	0.503	0.597	0.665	0.713	0.745	0.764	0.775	0.779	0.780	0.793
2.500	0.119	0.295	0.424	0.520	0.590	0.639	0.672	0.693	0.704	0.709	0.709	0.743
3.000	0.056	0.227	0.355	0.450	0.520	0.570	0.603	0.624	0.635	0.640	0.641	0.693

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.020	-0.100	-0.053	-0.029	-0.015	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000	0.000
0.040	-0.100	-0.056	-0.032	-0.018	-0.010	-0.006	-0.003	-0.002	-0.001	-0.000	0.000
0.060	-0.100	-0.059	-0.034	-0.020	-0.012	-0.008	-0.005	-0.003	-0.002	-0.001	0.000
0.100	-0.100	-0.063	-0.039	-0.025	-0.016	-0.011	-0.007	-0.005	-0.003	-0.001	0.000
0.150	-0.100	-0.066	-0.044	-0.029	-0.020	-0.014	-0.009	-0.006	-0.004	-0.002	0.000
0.200	-0.100	-0.069	-0.047	-0.033	-0.023	-0.016	-0.011	-0.008	-0.005	-0.002	0.000
0.250	-0.100	-0.071	-0.050	-0.035	-0.025	-0.018	-0.013	-0.009	-0.006	-0.003	0.000
0.300	-0.100	-0.073	-0.052	-0.038	-0.028	-0.020	-0.015	-0.010	-0.007	-0.003	0.000
0.400	-0.100	-0.075	-0.056	-0.042	-0.032	-0.024	-0.018	-0.012	-0.008	-0.004	0.000
0.500	-0.100	-0.077	-0.059	-0.045	-0.035	-0.026	-0.020	-0.014	-0.009	-0.004	0.000
0.600	-0.100	-0.078	-0.061	-0.048	-0.037	-0.029	-0.022	-0.016	-0.010	-0.005	0.000
0.800	-0.100	-0.080	-0.064	-0.052	-0.041	-0.032	-0.025	-0.018	-0.012	-0.006	0.000
1.000	-0.100	-0.082	-0.067	-0.054	-0.044	-0.035	-0.027	-0.020	-0.013	-0.006	0.000
1.200	-0.100	-0.082	-0.068	-0.056	-0.046	-0.037	-0.029	-0.021	-0.014	-0.007	0.000
1.500	-0.100	-0.083	-0.070	-0.058	-0.048	-0.039	-0.030	-0.022	-0.015	-0.007	0.000
2.000	-0.100	-0.084	-0.071	-0.060	-0.050	-0.041	-0.032	-0.024	-0.016	-0.008	0.000
2.500	-0.100	-0.084	-0.072	-0.061	-0.051	-0.042	-0.033	-0.025	-0.016	-0.008	0.000
3.000	-0.100	-0.083	-0.071	-0.061	-0.051	-0.042	-0.033	-0.025	-0.016	-0.008	0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

(TD)=	0.100	0.250	0.500	1.000	2.000
	0.705	0.719	0.744	0.803	0.947

CASE III - CONSTANT PRESSURE AT THE PRODUCING FACE AND A SEALED EXTERNAL BOUNDARY $\overline{P}_w = 0.10$

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 0.000

PRESSURE SQUARED DISTRIBUTION

TIME	DISTANCE(X)=											PMEAN
(TD)	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	(PM)
0.005	0.010	0.864	0.980	0.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.010	0.010	0.639	0.914	0.982	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.941
0.015	0.010	0.516	0.825	0.950	0.988	0.997	0.999	1.000	1.000	1.000	1.000	0.925
0.020	0.010	0.456	0.751	0.907	0.971	0.992	0.998	1.000	1.000	1.000	1.000	0.912
0.030	0.010	0.374	0.650	0.827	0.926	0.972	0.990	0.997	0.999	1.000	1.000	0.890
0.040	0.010	0.328	0.582	0.763	0.878	0.943	0.976	0.991	0.997	0.999	0.999	0.872
0.050	0.010	0.295	0.532	0.710	0.834	0.912	0.957	0.980	0.992	0.996	0.998	0.857
0.060	0.010	0.271	0.494	0.668	0.795	0.881	0.935	0.967	0.984	0.992	0.994	0.842
0.080	0.010	0.237	0.436	0.601	0.730	0.825	0.892	0.936	0.963	0.977	0.981	0.817
0.100	0.010	0.213	0.396	0.552	0.678	0.777	0.851	0.902	0.936	0.955	0.961	0.795
0.125	0.010	0.192	0.359	0.504	0.627	0.726	0.803	0.860	0.893	0.921	0.928	0.770
0.150	0.010	0.177	0.330	0.467	0.585	0.682	0.760	0.819	0.863	0.894	0.902	0.748
0.175	0.010	0.164	0.308	0.437	0.549	0.644	0.720	0.780	0.821	0.844	0.854	0.728
0.200	0.010	0.154	0.289	0.411	0.518	0.610	0.684	0.742	0.784	0.808	0.817	0.709
0.250	0.010	0.138	0.258	0.369	0.466	0.551	0.620	0.675	0.714	0.738	0.745	0.675
0.300	0.010	0.125	0.234	0.334	0.424	0.501	0.565	0.616	0.652	0.674	0.681	0.644
0.350	0.010	0.115	0.214	0.305	0.387	0.458	0.517	0.563	0.597	0.617	0.624	0.616
0.400	0.010	0.106	0.197	0.280	0.355	0.420	0.475	0.518	0.549	0.567	0.574	0.591
0.500	0.010	0.091	0.168	0.239	0.303	0.358	0.405	0.441	0.468	0.484	0.489	0.546
0.600	0.010	0.080	0.146	0.207	0.262	0.310	0.349	0.381	0.404	0.417	0.422	0.508
0.700	0.010	0.071	0.128	0.181	0.229	0.270	0.305	0.332	0.352	0.364	0.368	0.475
0.800	0.010	0.063	0.113	0.160	0.202	0.238	0.268	0.292	0.310	0.320	0.324	0.446
1.000	0.010	0.052	0.091	0.128	0.160	0.189	0.213	0.232	0.245	0.254	0.256	0.393
1.250	0.010	0.042	0.072	0.100	0.125	0.147	0.165	0.179	0.190	0.196	0.198	0.352
1.500	0.010	0.035	0.059	0.081	0.101	0.118	0.132	0.144	0.152	0.157	0.158	0.316
1.750	0.010	0.030	0.049	0.067	0.083	0.097	0.109	0.118	0.124	0.128	0.130	0.283
2.000	0.010	0.027	0.042	0.057	0.070	0.082	0.091	0.099	0.104	0.108	0.109	0.265
2.500	0.010	0.022	0.033	0.043	0.052	0.060	0.067	0.073	0.076	0.079	0.080	0.229
3.000	0.010	0.019	0.027	0.034	0.041	0.047	0.052	0.056	0.059	0.061	0.061	0.204
3.500	0.010	0.016	0.023	0.029	0.034	0.038	0.042	0.045	0.047	0.049	0.049	0.185
4.000	0.010	0.015	0.020	0.024	0.029	0.032	0.035	0.038	0.039	0.040	0.041	0.170
5.000	0.010	0.013	0.016	0.019	0.022	0.024	0.026	0.028	0.029	0.030	0.030	0.149
6.000	0.010	0.012	0.014	0.016	0.018	0.020	0.021	0.022	0.023	0.023	0.024	0.136
7.000	0.010	0.012	0.013	0.014	0.016	0.017	0.018	0.019	0.019	0.019	0.020	0.125

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 0.000

FLOWRATE DISTRIBUTION

0.005	-8.798	-1.401	-0.200	-0.029	-0.004	0.0	0.001	-0.000	-0.000	-0.000	-0.000
0.010	-3.400	-2.339	-0.668	-0.148	-0.029	-0.005	0.0	0.001	-0.000	-0.000	-0.000
0.015	-3.083	-2.050	-1.010	-0.338	-0.090	-0.020	-0.004	0.0	0.001	-0.000	-0.000
0.020	-2.504	-1.867	-1.100	-0.502	-0.180	-0.052	-0.013	-0.002	0.0	0.001	-0.000
0.030	-2.004	-1.625	-1.119	-0.668	-0.337	-0.144	-0.054	-0.018	-0.005	-0.001	-0.000
0.040	-1.699	-1.443	-1.086	-0.726	-0.436	-0.232	-0.108	-0.045	-0.017	-0.005	-0.000
0.050	-1.514	-1.321	-1.037	-0.746	-0.492	-0.296	-0.162	-0.081	-0.036	-0.013	-0.000
0.060	-1.373	-1.219	-0.993	-0.748	-0.525	-0.343	-0.207	-0.115	-0.057	-0.023	-0.000
0.080	-1.180	-1.076	-0.912	-0.732	-0.556	-0.400	-0.271	-0.171	-0.099	-0.044	-0.000
0.100	-1.050	-0.971	-0.848	-0.705	-0.561	-0.427	-0.310	-0.211	-0.129	-0.051	-0.000
0.125	-0.937	-0.877	-0.781	-0.669	-0.552	-0.439	-0.333	-0.237	-0.151	-0.073	-0.000
0.150	-0.852	-0.805	-0.729	-0.636	-0.537	-0.437	-0.340	-0.249	-0.162	-0.080	-0.000
0.175	-0.787	-0.749	-0.682	-0.604	-0.517	-0.427	-0.338	-0.251	-0.165	-0.082	-0.000
0.200	-0.735	-0.700	-0.644	-0.574	-0.496	-0.414	-0.331	-0.248	-0.164	-0.081	-0.000
0.250	-0.650	-0.624	-0.577	-0.520	-0.455	-0.385	-0.311	-0.235	-0.156	-0.077	-0.000
0.300	-0.585	-0.562	-0.524	-0.474	-0.417	-0.354	-0.287	-0.217	-0.145	-0.073	-0.000
0.350	-0.532	-0.512	-0.477	-0.432	-0.381	-0.325	-0.263	-0.200	-0.135	-0.067	-0.000
0.400	-0.486	-0.468	-0.437	-0.396	-0.350	-0.298	-0.243	-0.185	-0.124	-0.062	-0.000
0.500	-0.412	-0.398	-0.370	-0.337	-0.298	-0.254	-0.207	-0.157	-0.105	-0.052	-0.000
0.600	-0.354	-0.340	-0.319	-0.289	-0.256	-0.218	-0.177	-0.135	-0.090	-0.045	-0.000
0.700	-0.306	-0.296	-0.276	-0.251	-0.223	-0.189	-0.155	-0.117	-0.079	-0.039	-0.000
0.800	-0.268	-0.260	-0.243	-0.220	-0.195	-0.167	-0.136	-0.102	-0.069	-0.035	-0.000
1.000	-0.210	-0.204	-0.190	-0.173	-0.152	-0.130	-0.106	-0.081	-0.055	-0.026	-0.000
1.250	-0.160	-0.155	-0.145	-0.132	-0.117	-0.100	-0.081	-0.062	-0.040	-0.022	-0.000
1.500	-0.126	-0.123	-0.114	-0.104	-0.092	-0.079	-0.064	-0.049	-0.032	-0.015	-0.000
1.750	-0.101	-0.098	-0.092	-0.085	-0.074	-0.063	-0.051	-0.039	-0.026	-0.013	-0.000
2.000	-0.082	-0.081	-0.075	-0.069	-0.061	-0.052	-0.042	-0.032	-0.021	-0.011	-0.000
2.500	-0.057	-0.056	-0.052	-0.048	-0.043	-0.037	-0.030	-0.023	-0.014	-0.007	-0.000
3.000	-0.042	-0.042	-0.039	-0.036	-0.031	-0.026	-0.021	-0.017	-0.011	-0.005	-0.000
3.500	-0.032	-0.031	-0.030	-0.027	-0.024	-0.020	-0.017	-0.012	-0.008	-0.004	-0.000
4.000	-0.025	-0.024	-0.023	-0.020	-0.018	-0.015	-0.013	-0.010	-0.006	-0.002	-0.000
5.000	-0.015	-0.015	-0.014	-0.013	-0.012	-0.010	-0.008	-0.006	-0.004	-0.001	-0.000
6.000	-0.011	-0.010	-0.010	-0.008	-0.007	-0.006	-0.005	-0.004	-0.002	-0.001	-0.000
7.000	-0.007	-0.007	-0.006	-0.006	-0.005	-0.005	-0.004	-0.002	-0.001	0.0	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	0.429	0.314	0.419	1.645

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.922	0.993	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.973
0.010	0.010	0.894	0.985	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.015	0.010	0.867	0.976	0.994	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.020	0.010	0.842	0.968	0.991	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.964
0.030	0.010	0.795	0.949	0.984	0.994	0.998	0.999	1.000	1.000	1.000	1.000	0.958
0.040	0.010	0.754	0.931	0.976	0.991	0.996	0.998	0.999	1.000	1.000	1.000	0.953
0.050	0.010	0.718	0.912	0.968	0.987	0.994	0.997	0.999	0.999	1.000	1.000	0.949
0.060	0.010	0.685	0.894	0.958	0.982	0.992	0.996	0.998	0.999	1.000	1.000	0.943
0.080	0.010	0.628	0.858	0.939	0.971	0.986	0.993	0.996	0.998	0.999	0.999	0.934
0.100	0.010	0.582	0.824	0.920	0.960	0.979	0.988	0.993	0.996	0.997	0.998	0.926
0.125	0.010	0.534	0.785	0.895	0.945	0.969	0.982	0.989	0.993	0.995	0.996	0.916
0.150	0.010	0.495	0.750	0.870	0.929	0.959	0.975	0.985	0.990	0.992	0.993	0.907
0.175	0.010	0.463	0.717	0.847	0.913	0.948	0.968	0.979	0.985	0.988	0.989	0.899
0.200	0.010	0.435	0.688	0.824	0.897	0.937	0.960	0.973	0.980	0.984	0.985	0.890
0.250	0.010	0.390	0.637	0.782	0.865	0.914	0.943	0.959	0.969	0.974	0.975	0.875
0.300	0.010	0.355	0.594	0.744	0.835	0.890	0.924	0.944	0.956	0.961	0.953	0.860
0.350	0.010	0.327	0.558	0.709	0.806	0.867	0.905	0.928	0.941	0.948	0.949	0.846
0.400	0.010	0.305	0.526	0.678	0.778	0.844	0.885	0.911	0.926	0.933	0.934	0.833
0.500	0.010	0.269	0.474	0.623	0.728	0.799	0.846	0.875	0.892	0.900	0.902	0.808
0.600	0.010	0.242	0.433	0.577	0.682	0.756	0.806	0.838	0.857	0.866	0.868	0.785
0.700	0.010	0.221	0.399	0.538	0.642	0.716	0.768	0.801	0.821	0.830	0.832	0.763
0.800	0.010	0.204	0.370	0.503	0.605	0.679	0.731	0.765	0.785	0.794	0.797	0.743
1.000	0.010	0.178	0.324	0.445	0.540	0.611	0.662	0.695	0.715	0.725	0.727	0.704
1.250	0.010	0.153	0.279	0.386	0.471	0.537	0.584	0.615	0.634	0.643	0.645	0.660
1.500	0.010	0.133	0.244	0.338	0.414	0.472	0.515	0.544	0.561	0.570	0.572	0.620
1.750	0.010	0.117	0.214	0.297	0.364	0.417	0.455	0.481	0.497	0.505	0.507	0.582
2.000	0.010	0.104	0.189	0.262	0.322	0.368	0.403	0.426	0.440	0.447	0.449	0.543
2.500	0.010	0.083	0.148	0.205	0.252	0.289	0.316	0.335	0.347	0.353	0.354	0.486
3.000	0.010	0.066	0.118	0.162	0.199	0.228	0.250	0.266	0.275	0.280	0.281	0.433
3.500	0.010	0.054	0.094	0.130	0.159	0.182	0.200	0.212	0.220	0.224	0.225	0.383
4.000	0.010	0.045	0.077	0.104	0.128	0.146	0.160	0.171	0.177	0.180	0.181	0.343
5.000	0.010	0.032	0.052	0.069	0.084	0.097	0.106	0.113	0.117	0.120	0.120	0.285
6.000	0.010	0.024	0.037	0.048	0.058	0.066	0.073	0.078	0.081	0.082	0.083	0.233
7.000	0.010	0.019	0.028	0.035	0.042	0.048	0.052	0.055	0.058	0.059	0.059	0.204

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.005	-0.699	-0.209	-0.047	-0.008	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.668	-0.225	-0.063	-0.018	-0.005	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.641	-0.237	-0.077	-0.026	-0.009	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000
0.020	-0.617	-0.247	-0.088	-0.033	-0.013	-0.004	-0.001	-0.000	-0.000	-0.000	-0.000
0.030	-0.576	-0.261	-0.106	-0.046	-0.020	-0.009	-0.004	-0.001	-0.000	-0.000	-0.000
0.040	-0.543	-0.270	-0.121	-0.056	-0.027	-0.013	-0.006	-0.003	-0.001	-0.000	-0.000
0.050	-0.515	-0.276	-0.132	-0.066	-0.034	-0.018	-0.009	-0.005	-0.002	-0.001	-0.000
0.060	-0.491	-0.279	-0.142	-0.074	-0.040	-0.022	-0.012	-0.006	-0.003	-0.001	-0.000
0.080	-0.452	-0.282	-0.157	-0.088	-0.051	-0.030	-0.018	-0.010	-0.006	-0.002	-0.000
0.100	-0.422	-0.282	-0.168	-0.100	-0.061	-0.037	-0.023	-0.014	-0.008	-0.004	-0.000
0.125	-0.393	-0.279	-0.178	-0.111	-0.071	-0.046	-0.029	-0.019	-0.011	-0.005	-0.000
0.150	-0.369	-0.274	-0.184	-0.120	-0.079	-0.053	-0.035	-0.023	-0.014	-0.007	-0.000
0.175	-0.350	-0.270	-0.188	-0.128	-0.087	-0.059	-0.040	-0.027	-0.016	-0.008	-0.000
0.200	-0.335	-0.265	-0.191	-0.133	-0.093	-0.065	-0.045	-0.030	-0.019	-0.009	-0.000
0.250	-0.309	-0.255	-0.194	-0.142	-0.103	-0.074	-0.053	-0.037	-0.023	-0.011	-0.000
0.300	-0.290	-0.246	-0.194	-0.147	-0.110	-0.081	-0.059	-0.042	-0.027	-0.013	-0.000
0.350	-0.274	-0.238	-0.193	-0.150	-0.115	-0.087	-0.065	-0.046	-0.029	-0.014	-0.000
0.400	-0.261	-0.231	-0.191	-0.152	-0.119	-0.092	-0.069	-0.049	-0.032	-0.016	-0.000
0.500	-0.241	-0.218	-0.186	-0.154	-0.124	-0.098	-0.075	-0.054	-0.035	-0.017	-0.000
0.600	-0.225	-0.207	-0.181	-0.153	-0.126	-0.101	-0.078	-0.057	-0.038	-0.018	-0.000
0.700	-0.213	-0.198	-0.175	-0.150	-0.126	-0.102	-0.080	-0.059	-0.039	-0.019	-0.000
0.800	-0.203	-0.190	-0.170	-0.147	-0.125	-0.102	-0.081	-0.060	-0.039	-0.019	-0.000
1.000	-0.186	-0.176	-0.160	-0.141	-0.121	-0.100	-0.080	-0.060	-0.040	-0.019	-0.000
1.250	-0.169	-0.161	-0.148	-0.132	-0.114	-0.096	-0.077	-0.058	-0.038	-0.019	-0.000
1.500	-0.155	-0.148	-0.137	-0.123	-0.107	-0.090	-0.072	-0.054	-0.036	-0.018	-0.000
1.750	-0.143	-0.137	-0.127	-0.114	-0.100	-0.084	-0.068	-0.051	-0.034	-0.017	-0.000
2.000	-0.133	-0.127	-0.118	-0.106	-0.093	-0.078	-0.063	-0.048	-0.032	-0.016	-0.000
2.500	-0.114	-0.109	-0.102	-0.092	-0.080	-0.068	-0.055	-0.041	-0.028	-0.014	-0.000
3.000	-0.098	-0.094	-0.088	-0.079	-0.069	-0.059	-0.047	-0.036	-0.024	-0.012	-0.000
3.500	-0.084	-0.081	-0.075	-0.068	-0.060	-0.051	-0.041	-0.031	-0.021	-0.010	-0.000
4.000	-0.072	-0.070	-0.065	-0.059	-0.052	-0.044	-0.035	-0.027	-0.018	-0.009	-0.000
5.000	-0.053	-0.052	-0.048	-0.044	-0.038	-0.033	-0.026	-0.020	-0.013	-0.007	-0.000
6.000	-0.039	-0.038	-0.036	-0.033	-0.029	-0.024	-0.020	-0.015	-0.010	-0.005	-0.000
7.000	-0.029	-0.028	-0.027	-0.024	-0.021	-0.018	-0.015	-0.011	-0.008	-0.004	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.430	2.269	2.546	3.995

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.924	0.993	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.973
0.010	0.010	0.904	0.988	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.015	0.010	0.884	0.982	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.020	0.010	0.865	0.976	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.966
0.030	0.010	0.830	0.963	0.989	0.996	0.999	1.000	1.000	1.000	1.000	1.000	0.962
0.040	0.010	0.798	0.950	0.984	0.994	0.998	0.999	1.000	1.000	1.000	1.000	0.958
0.050	0.010	0.768	0.937	0.978	0.991	0.996	0.998	0.999	1.000	1.000	1.000	0.954
0.060	0.010	0.740	0.923	0.972	0.988	0.995	0.998	0.999	0.999	1.000	1.000	0.951
0.080	0.010	0.691	0.897	0.959	0.982	0.991	0.995	0.998	0.999	0.999	0.999	0.944
0.100	0.010	0.649	0.871	0.946	0.975	0.987	0.993	0.996	0.998	0.998	0.999	0.937
0.125	0.010	0.605	0.840	0.928	0.965	0.981	0.989	0.994	0.996	0.997	0.997	0.930
0.150	0.010	0.567	0.811	0.911	0.954	0.975	0.985	0.991	0.994	0.995	0.996	0.922
0.175	0.010	0.534	0.784	0.893	0.943	0.968	0.981	0.988	0.991	0.993	0.994	0.915
0.200	0.010	0.505	0.758	0.876	0.932	0.960	0.975	0.984	0.988	0.991	0.991	0.903
0.250	0.010	0.458	0.712	0.842	0.909	0.945	0.964	0.976	0.982	0.984	0.985	0.895
0.300	0.010	0.421	0.672	0.811	0.886	0.928	0.952	0.966	0.974	0.977	0.978	0.885
0.350	0.010	0.390	0.637	0.781	0.864	0.911	0.939	0.956	0.965	0.969	0.970	0.873
0.400	0.010	0.365	0.605	0.753	0.842	0.894	0.926	0.944	0.955	0.959	0.960	0.863
0.500	0.010	0.324	0.552	0.704	0.800	0.860	0.898	0.920	0.933	0.938	0.940	0.843
0.600	0.010	0.293	0.509	0.660	0.761	0.827	0.869	0.895	0.909	0.915	0.917	0.824
0.700	0.010	0.269	0.474	0.622	0.725	0.795	0.840	0.868	0.884	0.891	0.892	0.806
0.800	0.010	0.249	0.443	0.588	0.692	0.764	0.811	0.841	0.858	0.865	0.867	0.780
1.000	0.010	0.219	0.394	0.531	0.633	0.706	0.755	0.787	0.805	0.813	0.815	0.757
1.250	0.010	0.190	0.346	0.472	0.569	0.640	0.689	0.721	0.739	0.748	0.749	0.720
1.500	0.010	0.169	0.308	0.423	0.513	0.581	0.628	0.659	0.677	0.685	0.687	0.686
1.750	0.010	0.152	0.277	0.382	0.465	0.528	0.573	0.602	0.619	0.627	0.629	0.654
2.000	0.010	0.137	0.251	0.346	0.422	0.481	0.527	0.550	0.565	0.573	0.574	0.624
2.500	0.010	0.114	0.207	0.286	0.350	0.399	0.434	0.458	0.472	0.478	0.480	0.562
3.000	0.010	0.095	0.172	0.238	0.291	0.332	0.362	0.382	0.394	0.399	0.401	0.523
3.500	0.010	0.080	0.144	0.198	0.243	0.277	0.302	0.319	0.329	0.334	0.335	0.476
4.000	0.010	0.068	0.121	0.166	0.203	0.232	0.253	0.268	0.276	0.281	0.282	0.435
5.000	0.010	0.050	0.086	0.118	0.144	0.164	0.179	0.190	0.196	0.199	0.200	0.363
6.000	0.010	0.038	0.063	0.085	0.104	0.118	0.129	0.137	0.141	0.144	0.144	0.314
7.000	0.010	0.029	0.047	0.063	0.076	0.086	0.094	0.100	0.104	0.105	0.106	0.273

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.005	-0.500	-0.152	-0.036	-0.007	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.485	-0.160	-0.045	-0.013	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.470	-0.167	-0.052	-0.017	-0.006	-0.002	-0.000	-0.000	-0.000	-0.000	-0.000
0.020	-0.457	-0.173	-0.059	-0.022	-0.008	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000
0.030	-0.434	-0.182	-0.069	-0.029	-0.013	-0.006	-0.002	-0.001	-0.000	-0.000	-0.000
0.040	-0.414	-0.189	-0.079	-0.035	-0.017	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000
0.050	-0.396	-0.194	-0.086	-0.041	-0.021	-0.011	-0.006	-0.003	-0.001	-0.000	-0.000
0.060	-0.381	-0.197	-0.093	-0.046	-0.024	-0.013	-0.007	-0.004	-0.002	-0.001	-0.000
0.080	-0.356	-0.202	-0.103	-0.055	-0.031	-0.018	-0.010	-0.006	-0.003	-0.001	-0.000
0.100	-0.335	-0.204	-0.112	-0.063	-0.037	-0.022	-0.014	-0.008	-0.005	-0.002	-0.000
0.125	-0.314	-0.204	-0.120	-0.071	-0.043	-0.027	-0.017	-0.011	-0.006	-0.003	-0.000
0.150	-0.297	-0.203	-0.126	-0.077	-0.049	-0.032	-0.021	-0.013	-0.008	-0.004	-0.000
0.175	-0.283	-0.202	-0.130	-0.083	-0.054	-0.036	-0.024	-0.016	-0.010	-0.005	-0.000
0.200	-0.271	-0.200	-0.133	-0.088	-0.058	-0.039	-0.027	-0.018	-0.011	-0.005	-0.000
0.250	-0.251	-0.195	-0.138	-0.095	-0.066	-0.046	-0.032	-0.022	-0.014	-0.007	-0.000
0.300	-0.236	-0.190	-0.140	-0.100	-0.072	-0.051	-0.037	-0.025	-0.016	-0.008	-0.000
0.350	-0.224	-0.185	-0.141	-0.104	-0.076	-0.056	-0.040	-0.028	-0.018	-0.009	-0.000
0.400	-0.214	-0.181	-0.141	-0.107	-0.080	-0.060	-0.044	-0.031	-0.020	-0.010	-0.000
0.500	-0.197	-0.172	-0.141	-0.111	-0.086	-0.065	-0.049	-0.035	-0.023	-0.011	-0.000
0.600	-0.185	-0.165	-0.138	-0.112	-0.089	-0.069	-0.053	-0.038	-0.025	-0.012	-0.000
0.700	-0.175	-0.159	-0.136	-0.113	-0.091	-0.072	-0.055	-0.040	-0.026	-0.013	-0.000
0.800	-0.167	-0.153	-0.133	-0.112	-0.092	-0.074	-0.057	-0.042	-0.027	-0.013	-0.000
1.000	-0.154	-0.144	-0.128	-0.110	-0.092	-0.075	-0.059	-0.044	-0.029	-0.014	-0.000
1.250	-0.142	-0.134	-0.121	-0.106	-0.090	-0.075	-0.059	-0.044	-0.029	-0.014	-0.000
1.500	-0.132	-0.125	-0.114	-0.101	-0.087	-0.073	-0.058	-0.043	-0.029	-0.014	-0.000
1.750	-0.124	-0.118	-0.108	-0.097	-0.084	-0.070	-0.056	-0.042	-0.028	-0.014	-0.000
2.000	-0.116	-0.111	-0.103	-0.092	-0.080	-0.067	-0.054	-0.040	-0.027	-0.013	-0.000
2.500	-0.104	-0.100	-0.092	-0.083	-0.072	-0.061	-0.049	-0.037	-0.025	-0.012	-0.000
3.000	-0.093	-0.089	-0.083	-0.075	-0.065	-0.055	-0.044	-0.033	-0.022	-0.011	-0.000
3.500	-0.084	-0.080	-0.074	-0.067	-0.059	-0.050	-0.040	-0.030	-0.020	-0.010	-0.000
4.000	-0.075	-0.072	-0.067	-0.060	-0.053	-0.045	-0.036	-0.027	-0.018	-0.009	-0.000
5.000	-0.060	-0.058	-0.054	-0.049	-0.043	-0.036	-0.029	-0.022	-0.015	-0.007	-0.000
6.000	-0.048	-0.047	-0.044	-0.039	-0.035	-0.029	-0.024	-0.018	-0.012	-0.006	-0.000
7.000	-0.039	-0.038	-0.035	-0.032	-0.028	-0.024	-0.019	-0.014	-0.010	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.491	2.320	2.461	3.472

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.925	0.994	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.973
0.010	0.010	0.908	0.989	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.015	0.010	0.892	0.984	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.020	0.010	0.876	0.979	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.030	0.010	0.847	0.969	0.991	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.964
0.040	0.010	0.819	0.958	0.987	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.961
0.050	0.010	0.793	0.948	0.983	0.993	0.997	0.999	0.999	1.000	1.000	1.000	0.959
0.060	0.010	0.768	0.937	0.978	0.991	0.996	0.998	0.999	1.000	1.000	1.000	0.954
0.080	0.010	0.724	0.915	0.968	0.986	0.993	0.997	0.998	0.999	0.999	1.000	0.949
0.100	0.010	0.686	0.893	0.957	0.981	0.990	0.995	0.997	0.998	0.999	0.999	0.943
0.125	0.010	0.644	0.867	0.944	0.973	0.986	0.992	0.995	0.997	0.998	0.998	0.936
0.150	0.010	0.607	0.842	0.929	0.965	0.981	0.989	0.993	0.996	0.997	0.997	0.930
0.175	0.010	0.575	0.818	0.915	0.956	0.976	0.986	0.991	0.994	0.995	0.995	0.924
0.200	0.010	0.547	0.795	0.900	0.947	0.970	0.982	0.988	0.992	0.993	0.994	0.913
0.250	0.010	0.500	0.753	0.872	0.929	0.958	0.973	0.982	0.987	0.989	0.989	0.907
0.300	0.010	0.462	0.716	0.844	0.910	0.945	0.964	0.975	0.981	0.983	0.984	0.897
0.350	0.010	0.430	0.682	0.818	0.891	0.932	0.954	0.967	0.974	0.977	0.978	0.887
0.400	0.010	0.403	0.652	0.793	0.873	0.918	0.944	0.959	0.967	0.970	0.971	0.873
0.500	0.010	0.360	0.600	0.748	0.837	0.890	0.922	0.940	0.950	0.955	0.956	0.860
0.600	0.010	0.327	0.556	0.707	0.802	0.862	0.898	0.920	0.932	0.937	0.938	0.843
0.700	0.010	0.301	0.520	0.670	0.770	0.834	0.874	0.899	0.912	0.918	0.919	0.828
0.800	0.010	0.279	0.489	0.638	0.740	0.807	0.850	0.877	0.891	0.897	0.899	0.813
1.000	0.010	0.246	0.437	0.581	0.684	0.756	0.803	0.832	0.848	0.855	0.856	0.784
1.250	0.010	0.215	0.388	0.523	0.624	0.696	0.745	0.776	0.793	0.800	0.802	0.752
1.500	0.010	0.192	0.349	0.475	0.571	0.642	0.690	0.721	0.739	0.746	0.748	0.721
1.750	0.010	0.174	0.317	0.434	0.525	0.592	0.639	0.669	0.686	0.694	0.695	0.693
2.000	0.010	0.159	0.289	0.398	0.483	0.547	0.592	0.621	0.637	0.644	0.646	0.665
2.500	0.010	0.134	0.244	0.337	0.411	0.467	0.507	0.533	0.548	0.554	0.556	0.615
3.000	0.010	0.115	0.208	0.287	0.351	0.400	0.435	0.457	0.471	0.476	0.478	0.572
3.500	0.010	0.099	0.178	0.246	0.301	0.343	0.373	0.393	0.404	0.410	0.411	0.529
4.000	0.010	0.086	0.154	0.212	0.258	0.295	0.321	0.338	0.348	0.353	0.354	0.490
5.000	0.010	0.065	0.115	0.157	0.192	0.218	0.238	0.251	0.259	0.262	0.263	0.423
6.000	0.010	0.050	0.086	0.118	0.143	0.163	0.178	0.188	0.194	0.197	0.198	0.367
7.000	0.010	0.039	0.066	0.089	0.108	0.123	0.134	0.142	0.147	0.149	0.150	0.322

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.005	-0.411	-0.125	-0.030	-0.006	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.400	-0.131	-0.036	-0.010	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.390	-0.136	-0.042	-0.014	-0.005	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.020	-0.381	-0.141	-0.046	-0.017	-0.006	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000
0.030	-0.365	-0.147	-0.054	-0.022	-0.010	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.040	-0.350	-0.153	-0.061	-0.027	-0.013	-0.006	-0.003	-0.001	-0.001	-0.000	-0.000
0.050	-0.337	-0.157	-0.067	-0.031	-0.015	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000
0.060	-0.326	-0.160	-0.072	-0.035	-0.018	-0.010	-0.005	-0.003	-0.001	-0.001	-0.000
0.080	-0.306	-0.164	-0.080	-0.042	-0.023	-0.013	-0.008	-0.004	-0.002	-0.001	-0.000
0.100	-0.290	-0.167	-0.087	-0.047	-0.027	-0.016	-0.010	-0.006	-0.003	-0.002	-0.000
0.125	-0.273	-0.168	-0.094	-0.054	-0.032	-0.020	-0.013	-0.008	-0.005	-0.002	-0.000
0.150	-0.259	-0.168	-0.099	-0.059	-0.036	-0.023	-0.015	-0.010	-0.006	-0.003	-0.000
0.175	-0.247	-0.168	-0.103	-0.063	-0.040	-0.026	-0.017	-0.011	-0.007	-0.003	-0.000
0.200	-0.237	-0.167	-0.106	-0.067	-0.044	-0.029	-0.020	-0.013	-0.008	-0.004	-0.000
0.250	-0.221	-0.164	-0.111	-0.074	-0.050	-0.034	-0.024	-0.016	-0.010	-0.005	-0.000
0.300	-0.208	-0.161	-0.114	-0.079	-0.055	-0.038	-0.027	-0.019	-0.012	-0.006	-0.000
0.350	-0.197	-0.158	-0.116	-0.083	-0.059	-0.042	-0.030	-0.021	-0.013	-0.006	-0.000
0.400	-0.189	-0.155	-0.117	-0.085	-0.062	-0.045	-0.033	-0.023	-0.015	-0.007	-0.000
0.500	-0.175	-0.149	-0.117	-0.089	-0.067	-0.051	-0.037	-0.026	-0.017	-0.008	-0.000
0.600	-0.164	-0.143	-0.116	-0.092	-0.071	-0.054	-0.041	-0.029	-0.019	-0.009	-0.000
0.700	-0.155	-0.138	-0.115	-0.093	-0.074	-0.057	-0.043	-0.031	-0.020	-0.010	-0.000
0.800	-0.148	-0.134	-0.114	-0.093	-0.075	-0.059	-0.045	-0.033	-0.021	-0.010	-0.000
1.000	-0.137	-0.126	-0.110	-0.093	-0.077	-0.062	-0.048	-0.035	-0.023	-0.011	-0.000
1.250	-0.126	-0.118	-0.105	-0.091	-0.076	-0.063	-0.049	-0.036	-0.024	-0.012	-0.000
1.500	-0.118	-0.111	-0.101	-0.088	-0.075	-0.062	-0.049	-0.037	-0.024	-0.012	-0.000
1.750	-0.111	-0.106	-0.096	-0.085	-0.073	-0.061	-0.049	-0.036	-0.024	-0.012	-0.000
2.000	-0.105	-0.100	-0.092	-0.082	-0.071	-0.059	-0.047	-0.035	-0.023	-0.011	-0.000
2.500	-0.095	-0.091	-0.084	-0.075	-0.066	-0.055	-0.044	-0.033	-0.022	-0.011	-0.000
3.000	-0.087	-0.083	-0.077	-0.069	-0.060	-0.051	-0.041	-0.031	-0.020	-0.010	-0.000
3.500	-0.079	-0.076	-0.071	-0.064	-0.056	-0.047	-0.038	-0.028	-0.019	-0.009	-0.000
4.000	-0.073	-0.070	-0.065	-0.058	-0.051	-0.043	-0.035	-0.026	-0.017	-0.009	-0.000
5.000	-0.061	-0.058	-0.054	-0.049	-0.043	-0.036	-0.029	-0.022	-0.015	-0.007	-0.000
6.000	-0.051	-0.049	-0.046	-0.041	-0.036	-0.030	-0.025	-0.019	-0.012	-0.006	-0.000
7.000	-0.042	-0.041	-0.038	-0.034	-0.030	-0.026	-0.021	-0.016	-0.010	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.519	2.351	2.424	3.237

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.926	0.994	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.973
0.010	0.010	0.911	0.990	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.015	0.010	0.897	0.986	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.020	0.010	0.883	0.981	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.030	0.010	0.857	0.973	0.993	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.040	0.010	0.832	0.964	0.989	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.962
0.050	0.010	0.808	0.954	0.986	0.994	0.998	0.999	1.000	1.000	1.000	1.000	0.959
0.060	0.010	0.786	0.945	0.982	0.993	0.997	0.998	0.999	1.000	1.000	1.000	0.957
0.080	0.010	0.746	0.926	0.973	0.989	0.995	0.997	0.999	0.999	1.000	1.000	0.951
0.100	0.010	0.710	0.907	0.964	0.984	0.992	0.996	0.998	0.999	0.999	0.999	0.946
0.125	0.010	0.670	0.884	0.952	0.978	0.989	0.994	0.996	0.998	0.998	0.998	0.941
0.150	0.010	0.635	0.861	0.940	0.971	0.985	0.991	0.995	0.996	0.997	0.998	0.935
0.175	0.010	0.604	0.840	0.928	0.964	0.980	0.988	0.993	0.995	0.996	0.996	0.929
0.200	0.010	0.577	0.819	0.915	0.956	0.976	0.985	0.991	0.993	0.995	0.995	0.924
0.250	0.010	0.530	0.780	0.890	0.941	0.966	0.979	0.986	0.989	0.991	0.991	0.914
0.300	0.010	0.491	0.745	0.866	0.925	0.955	0.971	0.980	0.985	0.987	0.987	0.905
0.350	0.010	0.459	0.713	0.842	0.908	0.944	0.963	0.974	0.979	0.982	0.982	0.896
0.400	0.010	0.432	0.684	0.819	0.892	0.932	0.954	0.967	0.973	0.976	0.977	0.887
0.500	0.010	0.387	0.633	0.777	0.860	0.908	0.935	0.951	0.960	0.964	0.964	0.871
0.600	0.010	0.353	0.590	0.739	0.829	0.883	0.916	0.935	0.945	0.949	0.950	0.856
0.700	0.010	0.325	0.553	0.704	0.799	0.859	0.895	0.917	0.928	0.933	0.934	0.842
0.800	0.010	0.302	0.522	0.672	0.771	0.835	0.874	0.898	0.911	0.916	0.918	0.828
1.000	0.010	0.267	0.469	0.617	0.719	0.788	0.832	0.859	0.874	0.880	0.882	0.802
1.250	0.010	0.234	0.419	0.560	0.662	0.733	0.781	0.810	0.826	0.833	0.834	0.773
1.500	0.010	0.210	0.379	0.512	0.611	0.683	0.731	0.761	0.778	0.785	0.787	0.744
1.750	0.010	0.191	0.346	0.471	0.566	0.636	0.684	0.714	0.731	0.738	0.739	0.718
2.000	0.010	0.175	0.318	0.435	0.526	0.593	0.639	0.669	0.685	0.692	0.694	0.693
2.500	0.010	0.149	0.272	0.374	0.455	0.516	0.558	0.585	0.601	0.608	0.609	0.644
3.000	0.010	0.129	0.235	0.324	0.396	0.449	0.487	0.512	0.526	0.532	0.533	0.603
3.500	0.010	0.113	0.205	0.282	0.345	0.392	0.426	0.448	0.460	0.466	0.457	0.564
4.000	0.010	0.099	0.179	0.247	0.301	0.343	0.372	0.392	0.403	0.408	0.409	0.528
5.000	0.010	0.077	0.137	0.189	0.230	0.262	0.285	0.300	0.309	0.313	0.314	0.463
6.000	0.010	0.061	0.107	0.146	0.177	0.202	0.220	0.232	0.239	0.242	0.243	0.407
7.000	0.010	0.048	0.083	0.113	0.138	0.157	0.170	0.180	0.185	0.188	0.189	0.352

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.005	-0.357	-0.109	-0.027	-0.005	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.349	-0.114	-0.031	-0.009	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.341	-0.118	-0.036	-0.012	-0.004	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.020	-0.334	-0.121	-0.039	-0.014	-0.005	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000
0.030	-0.321	-0.127	-0.046	-0.018	-0.008	-0.004	-0.001	-0.001	-0.000	-0.000	-0.000
0.040	-0.310	-0.131	-0.051	-0.022	-0.010	-0.005	-0.002	-0.001	-0.000	-0.000	-0.000
0.050	-0.300	-0.135	-0.056	-0.025	-0.013	-0.006	-0.003	-0.002	-0.001	-0.000	-0.000
0.060	-0.290	-0.137	-0.060	-0.028	-0.015	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000
0.080	-0.274	-0.142	-0.067	-0.034	-0.018	-0.011	-0.006	-0.004	-0.002	-0.001	-0.000
0.100	-0.261	-0.144	-0.073	-0.039	-0.022	-0.013	-0.008	-0.005	-0.003	-0.001	-0.000
0.125	-0.247	-0.146	-0.078	-0.044	-0.026	-0.016	-0.010	-0.006	-0.004	-0.002	-0.000
0.150	-0.235	-0.147	-0.083	-0.048	-0.029	-0.019	-0.012	-0.008	-0.005	-0.002	-0.000
0.175	-0.224	-0.147	-0.087	-0.052	-0.033	-0.021	-0.014	-0.009	-0.005	-0.003	-0.000
0.200	-0.216	-0.146	-0.090	-0.056	-0.035	-0.023	-0.016	-0.010	-0.006	-0.003	-0.000
0.250	-0.201	-0.145	-0.095	-0.061	-0.041	-0.027	-0.019	-0.013	-0.008	-0.004	-0.000
0.300	-0.190	-0.143	-0.098	-0.066	-0.045	-0.031	-0.022	-0.015	-0.009	-0.004	-0.000
0.350	-0.180	-0.140	-0.100	-0.069	-0.048	-0.034	-0.024	-0.017	-0.011	-0.005	-0.000
0.400	-0.172	-0.138	-0.101	-0.072	-0.052	-0.037	-0.027	-0.018	-0.012	-0.006	-0.000
0.500	-0.160	-0.133	-0.102	-0.076	-0.056	-0.042	-0.030	-0.021	-0.014	-0.007	-0.000
0.600	-0.150	-0.129	-0.102	-0.079	-0.060	-0.045	-0.034	-0.024	-0.015	-0.007	-0.000
0.700	-0.142	-0.124	-0.102	-0.080	-0.062	-0.048	-0.036	-0.026	-0.017	-0.008	-0.000
0.800	-0.136	-0.121	-0.101	-0.081	-0.064	-0.050	-0.038	-0.027	-0.018	-0.009	-0.000
1.000	-0.126	-0.114	-0.098	-0.082	-0.066	-0.053	-0.041	-0.030	-0.019	-0.009	-0.000
1.250	-0.116	-0.107	-0.095	-0.081	-0.067	-0.054	-0.043	-0.031	-0.021	-0.010	-0.000
1.500	-0.109	-0.102	-0.091	-0.079	-0.067	-0.055	-0.043	-0.032	-0.021	-0.010	-0.000
1.750	-0.103	-0.097	-0.088	-0.077	-0.066	-0.054	-0.043	-0.032	-0.021	-0.010	-0.000
2.000	-0.098	-0.092	-0.084	-0.074	-0.064	-0.053	-0.042	-0.032	-0.021	-0.010	-0.000
2.500	-0.089	-0.085	-0.078	-0.070	-0.060	-0.051	-0.041	-0.030	-0.020	-0.010	-0.000
3.000	-0.082	-0.078	-0.072	-0.065	-0.056	-0.047	-0.038	-0.029	-0.019	-0.009	-0.000
3.500	-0.075	-0.072	-0.067	-0.060	-0.053	-0.044	-0.036	-0.027	-0.018	-0.009	-0.000
4.000	-0.070	-0.067	-0.062	-0.056	-0.049	-0.041	-0.033	-0.025	-0.017	-0.008	-0.000
5.000	-0.060	-0.057	-0.053	-0.048	-0.042	-0.035	-0.029	-0.022	-0.014	-0.007	-0.000
6.000	-0.051	-0.049	-0.046	-0.041	-0.036	-0.031	-0.025	-0.019	-0.012	-0.006	-0.000
7.000	-0.044	-0.042	-0.039	-0.035	-0.031	-0.026	-0.021	-0.016	-0.011	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.537	2.374	2.405	3.097

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.926	0.994	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.973
0.010	0.010	0.913	0.990	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.972
0.015	0.010	0.900	0.986	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.020	0.010	0.888	0.983	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.030	0.010	0.864	0.975	0.993	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.966
0.040	0.010	0.841	0.967	0.990	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.963
0.050	0.010	0.820	0.959	0.987	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.961
0.060	0.010	0.799	0.950	0.984	0.994	0.997	0.999	0.999	1.000	1.000	1.000	0.958
0.080	0.010	0.762	0.934	0.977	0.990	0.995	0.998	0.999	0.999	1.000	1.000	0.953
0.100	0.010	0.728	0.917	0.969	0.986	0.993	0.996	0.998	0.999	0.999	0.999	0.949
0.125	0.010	0.690	0.896	0.958	0.981	0.990	0.995	0.997	0.998	0.999	0.999	0.943
0.150	0.010	0.656	0.875	0.948	0.975	0.987	0.993	0.995	0.997	0.998	0.998	0.939
0.175	0.010	0.626	0.855	0.937	0.969	0.983	0.990	0.994	0.996	0.997	0.997	0.933
0.200	0.010	0.599	0.836	0.925	0.962	0.979	0.988	0.992	0.994	0.995	0.996	0.928
0.250	0.010	0.553	0.800	0.903	0.949	0.971	0.982	0.988	0.991	0.993	0.993	0.919
0.300	0.010	0.515	0.766	0.881	0.934	0.961	0.975	0.983	0.987	0.989	0.989	0.911
0.350	0.010	0.482	0.736	0.859	0.920	0.951	0.968	0.978	0.983	0.985	0.985	0.902
0.400	0.010	0.454	0.708	0.838	0.905	0.941	0.961	0.972	0.978	0.980	0.981	0.894
0.500	0.010	0.409	0.658	0.798	0.876	0.920	0.945	0.959	0.966	0.969	0.970	0.879
0.600	0.010	0.373	0.616	0.762	0.848	0.898	0.927	0.944	0.953	0.957	0.958	0.865
0.700	0.010	0.345	0.579	0.729	0.820	0.876	0.909	0.929	0.939	0.944	0.945	0.852
0.800	0.010	0.321	0.548	0.698	0.794	0.854	0.891	0.912	0.924	0.929	0.930	0.832
1.000	0.010	0.284	0.495	0.644	0.745	0.811	0.853	0.878	0.892	0.898	0.899	0.815
1.250	0.010	0.250	0.443	0.588	0.690	0.760	0.806	0.834	0.849	0.856	0.857	0.787
1.500	0.010	0.224	0.403	0.540	0.642	0.713	0.760	0.790	0.806	0.812	0.814	0.761
1.750	0.010	0.204	0.369	0.500	0.598	0.668	0.716	0.746	0.762	0.769	0.771	0.736
2.000	0.010	0.188	0.341	0.464	0.558	0.627	0.674	0.704	0.720	0.727	0.729	0.713
2.500	0.010	0.161	0.294	0.403	0.489	0.553	0.597	0.625	0.641	0.647	0.649	0.669
3.000	0.010	0.141	0.257	0.354	0.430	0.488	0.528	0.554	0.568	0.575	0.576	0.623
3.500	0.010	0.124	0.226	0.311	0.379	0.431	0.467	0.491	0.504	0.510	0.511	0.591
4.000	0.010	0.110	0.199	0.275	0.335	0.381	0.414	0.435	0.447	0.452	0.453	0.554
5.000	0.010	0.087	0.157	0.215	0.263	0.299	0.325	0.341	0.351	0.355	0.356	0.492
6.000	0.010	0.070	0.124	0.170	0.207	0.235	0.256	0.269	0.277	0.280	0.281	0.438
7.000	0.010	0.057	0.099	0.135	0.164	0.186	0.202	0.213	0.219	0.222	0.223	0.391

SLIP COEFF(B)= 0.000 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.005	-0.320	-0.098	-0.024	-0.005	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.313	-0.102	-0.028	-0.008	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.307	-0.105	-0.031	-0.010	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.020	-0.302	-0.108	-0.034	-0.012	-0.005	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000
0.030	-0.291	-0.113	-0.040	-0.016	-0.007	-0.003	-0.001	-0.001	-0.000	-0.000	-0.000
0.040	-0.282	-0.116	-0.044	-0.019	-0.009	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.050	-0.273	-0.120	-0.048	-0.022	-0.011	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.060	-0.265	-0.122	-0.052	-0.024	-0.012	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000
0.080	-0.251	-0.126	-0.058	-0.029	-0.016	-0.009	-0.005	-0.003	-0.002	-0.001	-0.000
0.100	-0.240	-0.128	-0.063	-0.033	-0.019	-0.011	-0.007	-0.004	-0.002	-0.001	-0.000
0.125	-0.227	-0.130	-0.068	-0.037	-0.022	-0.013	-0.008	-0.005	-0.003	-0.001	-0.000
0.150	-0.217	-0.131	-0.072	-0.041	-0.025	-0.016	-0.010	-0.006	-0.004	-0.002	-0.000
0.175	-0.208	-0.132	-0.076	-0.045	-0.028	-0.018	-0.012	-0.008	-0.005	-0.002	-0.000
0.200	-0.200	-0.132	-0.079	-0.048	-0.030	-0.020	-0.013	-0.009	-0.005	-0.003	-0.000
0.250	-0.187	-0.131	-0.083	-0.053	-0.035	-0.023	-0.016	-0.011	-0.007	-0.003	-0.000
0.300	-0.176	-0.129	-0.086	-0.057	-0.038	-0.026	-0.018	-0.012	-0.008	-0.004	-0.000
0.350	-0.168	-0.128	-0.088	-0.060	-0.042	-0.029	-0.020	-0.014	-0.009	-0.004	-0.000
0.400	-0.161	-0.126	-0.090	-0.063	-0.044	-0.032	-0.022	-0.016	-0.010	-0.005	-0.000
0.500	-0.149	-0.122	-0.092	-0.067	-0.049	-0.036	-0.026	-0.018	-0.012	-0.006	-0.000
0.600	-0.140	-0.118	-0.092	-0.070	-0.052	-0.039	-0.029	-0.020	-0.013	-0.006	-0.000
0.700	-0.133	-0.115	-0.092	-0.071	-0.055	-0.042	-0.031	-0.022	-0.014	-0.007	-0.000
0.800	-0.127	-0.111	-0.091	-0.072	-0.057	-0.044	-0.033	-0.024	-0.015	-0.007	-0.000
1.000	-0.117	-0.106	-0.090	-0.073	-0.059	-0.047	-0.036	-0.026	-0.017	-0.008	-0.000
1.250	-0.109	-0.100	-0.087	-0.073	-0.060	-0.048	-0.038	-0.028	-0.018	-0.009	-0.000
1.500	-0.102	-0.095	-0.084	-0.072	-0.060	-0.049	-0.039	-0.029	-0.019	-0.009	-0.000
1.750	-0.096	-0.090	-0.081	-0.071	-0.060	-0.049	-0.039	-0.029	-0.019	-0.009	-0.000
2.000	-0.092	-0.086	-0.078	-0.069	-0.059	-0.049	-0.039	-0.029	-0.019	-0.009	-0.000
2.500	-0.084	-0.080	-0.073	-0.065	-0.056	-0.047	-0.037	-0.028	-0.019	-0.009	-0.000
3.000	-0.078	-0.074	-0.068	-0.061	-0.053	-0.045	-0.036	-0.027	-0.018	-0.009	-0.000
3.500	-0.072	-0.069	-0.064	-0.057	-0.050	-0.042	-0.034	-0.025	-0.017	-0.008	-0.000
4.000	-0.067	-0.064	-0.060	-0.054	-0.047	-0.039	-0.032	-0.024	-0.016	-0.008	-0.000
5.000	-0.058	-0.056	-0.052	-0.047	-0.041	-0.035	-0.028	-0.021	-0.014	-0.007	-0.000
6.000	-0.051	-0.049	-0.045	-0.041	-0.036	-0.030	-0.024	-0.018	-0.012	-0.006	-0.000
7.000	-0.044	-0.043	-0.040	-0.036	-0.031	-0.026	-0.021	-0.016	-0.011	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.549	2.391	2.392	3.000

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 0.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.837	0.972	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.964
0.010	0.010	0.573	0.883	0.972	0.994	0.999	1.000	1.000	1.000	1.000	1.000	0.932
0.015	0.010	0.442	0.770	0.925	0.979	0.995	0.999	1.000	1.000	1.000	1.000	0.913
0.020	0.010	0.384	0.686	0.868	0.953	0.985	0.996	0.999	1.000	1.000	1.000	0.897
0.030	0.010	0.302	0.575	0.770	0.890	0.953	0.982	0.993	0.998	0.999	1.000	0.871
0.040	0.010	0.259	0.502	0.695	0.828	0.911	0.958	0.982	0.992	0.997	0.998	0.848
0.050	0.010	0.227	0.451	0.636	0.775	0.870	0.930	0.965	0.983	0.991	0.994	0.829
0.060	0.010	0.205	0.412	0.590	0.729	0.831	0.900	0.944	0.970	0.983	0.986	0.812
0.080	0.010	0.174	0.355	0.519	0.655	0.763	0.843	0.900	0.936	0.956	0.962	0.781
0.100	0.010	0.153	0.315	0.467	0.598	0.707	0.791	0.854	0.896	0.921	0.929	0.754
0.125	0.010	0.135	0.279	0.418	0.542	0.647	0.733	0.798	0.844	0.871	0.880	0.724
0.150	0.010	0.122	0.253	0.380	0.497	0.597	0.681	0.746	0.792	0.820	0.829	0.696
0.175	0.010	0.111	0.231	0.349	0.458	0.554	0.634	0.697	0.742	0.770	0.779	0.672
0.200	0.010	0.103	0.213	0.323	0.425	0.516	0.592	0.652	0.696	0.722	0.731	0.648
0.250	0.010	0.089	0.184	0.280	0.370	0.450	0.518	0.573	0.612	0.636	0.644	0.607
0.300	0.010	0.079	0.162	0.246	0.325	0.396	0.457	0.505	0.541	0.562	0.569	0.570
0.350	0.010	0.070	0.143	0.218	0.288	0.351	0.405	0.449	0.480	0.499	0.506	0.537
0.400	0.010	0.063	0.128	0.194	0.256	0.313	0.361	0.400	0.428	0.445	0.451	0.507
0.500	0.010	0.052	0.103	0.156	0.206	0.251	0.290	0.322	0.345	0.359	0.363	0.455
0.600	0.010	0.044	0.085	0.128	0.169	0.206	0.237	0.263	0.282	0.293	0.297	0.413
0.700	0.010	0.038	0.072	0.107	0.140	0.171	0.197	0.218	0.234	0.243	0.246	0.377
0.800	0.010	0.033	0.061	0.090	0.118	0.143	0.165	0.183	0.196	0.204	0.207	0.347
1.000	0.010	0.027	0.046	0.067	0.086	0.104	0.120	0.133	0.142	0.148	0.150	0.297
1.250	0.010	0.022	0.035	0.048	0.062	0.074	0.084	0.093	0.099	0.103	0.105	0.252
1.500	0.010	0.018	0.028	0.037	0.046	0.055	0.062	0.068	0.073	0.076	0.077	0.219
1.750	0.010	0.016	0.023	0.030	0.036	0.043	0.048	0.052	0.056	0.058	0.058	0.195
2.000	0.010	0.015	0.020	0.025	0.030	0.034	0.038	0.041	0.044	0.045	0.046	0.176
2.500	0.010	0.013	0.016	0.019	0.021	0.024	0.026	0.028	0.029	0.030	0.031	0.140
3.000	0.010	0.012	0.014	0.015	0.017	0.019	0.020	0.021	0.022	0.022	0.022	0.132
3.500	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.017	0.018	0.018	0.122
4.000	0.010	0.011	0.011	0.012	0.013	0.014	0.014	0.014	0.015	0.015	0.015	0.115
5.000	0.010	0.010	0.011	0.011	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.107
6.000	0.010	0.010	0.010	0.010	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.103
7.000	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.101

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 0.000

FLOWRATE DISTRIBUTION

0.005	-24.057	-1.851	-0.307	-0.051	-0.007	-0.001	0.001	-0.000	-0.000	-0.000	-0.000
0.010	-6.826	-3.111	-0.992	-0.251	-0.057	-0.011	-0.002	0.0	0.001	-0.000	-0.000
0.015	-6.861	-2.611	-1.436	-0.546	-0.169	-0.045	-0.011	-0.002	0.0	0.001	-0.000
0.020	-5.107	-2.364	-1.499	-0.767	-0.313	-0.107	-0.032	-0.008	-0.001	0.0	-0.000
0.030	-3.937	-2.054	-1.481	-0.950	-0.532	-0.256	-0.108	-0.040	-0.014	-0.004	-0.000
0.040	-3.145	-1.807	-1.420	-1.002	-0.646	-0.379	-0.199	-0.094	-0.040	-0.013	-0.000
0.050	-2.746	-1.660	-1.342	-1.013	-0.708	-0.460	-0.275	-0.151	-0.075	-0.030	-0.000
0.060	-2.406	-1.523	-1.280	-1.001	-0.739	-0.513	-0.333	-0.201	-0.110	-0.048	-0.000
0.080	-1.991	-1.345	-1.165	-0.964	-0.762	-0.574	-0.411	-0.275	-0.165	-0.077	-0.000
0.100	-1.710	-1.208	-1.079	-0.919	-0.755	-0.595	-0.448	-0.317	-0.200	-0.096	-0.000
0.125	-1.483	-1.093	-0.987	-0.864	-0.731	-0.595	-0.464	-0.338	-0.220	-0.108	-0.000
0.150	-1.311	-0.998	-0.915	-0.812	-0.699	-0.580	-0.461	-0.342	-0.226	-0.112	-0.000
0.175	-1.188	-0.927	-0.854	-0.765	-0.664	-0.558	-0.448	-0.336	-0.223	-0.111	-0.000
0.200	-1.083	-0.861	-0.800	-0.721	-0.631	-0.532	-0.430	-0.324	-0.217	-0.108	-0.000
0.250	-0.925	-0.761	-0.708	-0.643	-0.567	-0.482	-0.392	-0.296	-0.199	-0.099	-0.000
0.300	-0.803	-0.676	-0.635	-0.576	-0.510	-0.435	-0.354	-0.269	-0.181	-0.090	-0.000
0.350	-0.707	-0.610	-0.570	-0.520	-0.460	-0.393	-0.320	-0.243	-0.163	-0.082	-0.000
0.400	-0.626	-0.549	-0.515	-0.470	-0.417	-0.356	-0.290	-0.220	-0.149	-0.074	-0.000
0.500	-0.503	-0.455	-0.426	-0.389	-0.345	-0.295	-0.240	-0.183	-0.124	-0.062	-0.000
0.600	-0.411	-0.379	-0.357	-0.326	-0.289	-0.248	-0.202	-0.154	-0.104	-0.051	-0.000
0.700	-0.344	-0.324	-0.302	-0.277	-0.246	-0.211	-0.173	-0.131	-0.088	-0.044	-0.000
0.800	-0.290	-0.275	-0.260	-0.238	-0.211	-0.181	-0.148	-0.112	-0.075	-0.037	-0.000
1.000	-0.216	-0.207	-0.194	-0.179	-0.158	-0.136	-0.112	-0.085	-0.057	-0.028	-0.000
1.250	-0.152	-0.148	-0.141	-0.129	-0.114	-0.098	-0.081	-0.061	-0.042	-0.020	-0.000
1.500	-0.114	-0.111	-0.105	-0.097	-0.086	-0.074	-0.061	-0.045	-0.031	-0.014	-0.000
1.750	-0.085	-0.083	-0.080	-0.074	-0.066	-0.056	-0.046	-0.035	-0.023	-0.011	-0.000
2.000	-0.067	-0.066	-0.062	-0.057	-0.051	-0.044	-0.037	-0.027	-0.018	-0.008	-0.000
2.500	-0.040	-0.039	-0.038	-0.035	-0.032	-0.028	-0.023	-0.017	-0.012	-0.006	-0.000
3.000	-0.026	-0.026	-0.024	-0.023	-0.020	-0.018	-0.015	-0.011	-0.008	-0.004	-0.000
3.500	-0.016	-0.016	-0.016	-0.015	-0.013	-0.012	-0.010	-0.007	-0.005	-0.003	-0.000
4.000	-0.012	-0.012	-0.010	-0.010	-0.009	-0.008	-0.006	-0.005	-0.003	-0.002	-0.000
5.000	-0.004	-0.004	-0.005	-0.004	-0.004	-0.003	-0.003	-0.002	-0.001	-0.001	-0.000
6.000	-0.003	-0.003	-0.002	-0.002	-0.002	-0.002	-0.001	-0.001	-0.001	-0.000	-0.000
7.000	-0.000	-0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.000	-0.000	-0.000	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	20.449	52.806	391.125	-225.001

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.907	0.990	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.879	0.981	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.963
0.015	0.010	0.853	0.972	0.993	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.020	0.010	0.829	0.963	0.990	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.962
0.030	0.010	0.783	0.945	0.982	0.993	0.997	0.999	1.000	1.000	1.000	1.000	0.957
0.040	0.010	0.743	0.926	0.974	0.989	0.995	0.998	0.999	1.000	1.000	1.000	0.951
0.050	0.010	0.708	0.907	0.965	0.985	0.993	0.997	0.998	0.999	1.000	1.000	0.946
0.060	0.010	0.675	0.888	0.956	0.980	0.990	0.995	0.998	0.999	0.999	0.999	0.942
0.080	0.010	0.620	0.852	0.936	0.969	0.984	0.991	0.995	0.997	0.998	0.998	0.933
0.100	0.010	0.575	0.819	0.916	0.958	0.977	0.987	0.992	0.995	0.997	0.997	0.925
0.125	0.010	0.528	0.780	0.891	0.942	0.967	0.981	0.988	0.992	0.994	0.994	0.915
0.150	0.010	0.489	0.744	0.867	0.926	0.957	0.973	0.983	0.988	0.990	0.991	0.906
0.175	0.010	0.457	0.712	0.843	0.910	0.946	0.966	0.977	0.983	0.986	0.987	0.897
0.200	0.010	0.429	0.683	0.820	0.894	0.934	0.957	0.971	0.978	0.981	0.982	0.883
0.250	0.010	0.385	0.632	0.778	0.862	0.911	0.939	0.956	0.966	0.970	0.971	0.872
0.300	0.010	0.350	0.589	0.739	0.831	0.887	0.920	0.940	0.952	0.957	0.958	0.858
0.350	0.010	0.322	0.552	0.705	0.802	0.863	0.901	0.924	0.936	0.942	0.944	0.843
0.400	0.010	0.300	0.521	0.673	0.774	0.839	0.880	0.906	0.920	0.927	0.928	0.830
0.500	0.010	0.264	0.468	0.618	0.722	0.793	0.840	0.869	0.885	0.893	0.895	0.805
0.600	0.010	0.237	0.427	0.571	0.676	0.750	0.799	0.831	0.849	0.857	0.859	0.781
0.700	0.010	0.216	0.392	0.531	0.635	0.709	0.760	0.793	0.811	0.820	0.822	0.759
0.800	0.010	0.199	0.364	0.496	0.597	0.671	0.722	0.755	0.774	0.783	0.785	0.737
1.000	0.010	0.172	0.317	0.437	0.531	0.601	0.651	0.684	0.703	0.711	0.713	0.693
1.250	0.010	0.147	0.271	0.377	0.461	0.525	0.571	0.602	0.620	0.628	0.630	0.652
1.500	0.010	0.127	0.235	0.327	0.402	0.460	0.501	0.529	0.545	0.553	0.555	0.610
1.750	0.010	0.111	0.205	0.286	0.352	0.403	0.440	0.465	0.479	0.486	0.488	0.571
2.000	0.010	0.098	0.180	0.250	0.308	0.353	0.386	0.409	0.422	0.429	0.429	0.536
2.500	0.010	0.076	0.139	0.193	0.238	0.273	0.299	0.316	0.327	0.332	0.333	0.471
3.000	0.010	0.060	0.108	0.150	0.184	0.212	0.232	0.245	0.254	0.258	0.259	0.416
3.500	0.010	0.048	0.085	0.117	0.144	0.165	0.181	0.192	0.198	0.202	0.202	0.369
4.000	0.010	0.039	0.067	0.092	0.113	0.129	0.142	0.150	0.156	0.158	0.159	0.327
5.000	0.010	0.027	0.043	0.058	0.070	0.080	0.088	0.093	0.097	0.099	0.099	0.262
6.000	0.010	0.020	0.029	0.038	0.045	0.051	0.056	0.060	0.062	0.063	0.063	0.211
7.000	0.010	0.016	0.021	0.026	0.031	0.034	0.037	0.039	0.041	0.042	0.042	0.175

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.005	-0.697	-0.224	-0.058	-0.013	-0.002	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.668	-0.237	-0.073	-0.023	-0.007	-0.002	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.643	-0.248	-0.086	-0.031	-0.012	-0.004	-0.001	-0.000	-0.000	-0.000	-0.000
0.020	-0.620	-0.257	-0.096	-0.039	-0.016	-0.006	-0.002	-0.001	-0.000	-0.000	-0.000
0.030	-0.582	-0.269	-0.114	-0.051	-0.024	-0.011	-0.005	-0.002	-0.001	-0.000	-0.000
0.040	-0.550	-0.277	-0.128	-0.062	-0.031	-0.016	-0.008	-0.004	-0.002	-0.001	-0.000
0.050	-0.523	-0.282	-0.139	-0.071	-0.038	-0.021	-0.011	-0.006	-0.003	-0.001	-0.000
0.060	-0.500	-0.285	-0.149	-0.079	-0.044	-0.025	-0.015	-0.008	-0.004	-0.002	-0.000
0.080	-0.462	-0.287	-0.163	-0.093	-0.055	-0.034	-0.021	-0.012	-0.007	-0.003	-0.000
0.100	-0.433	-0.286	-0.174	-0.105	-0.065	-0.041	-0.026	-0.016	-0.010	-0.005	-0.000
0.125	-0.404	-0.284	-0.183	-0.116	-0.075	-0.049	-0.033	-0.021	-0.013	-0.006	-0.000
0.150	-0.381	-0.279	-0.189	-0.125	-0.084	-0.056	-0.038	-0.025	-0.016	-0.007	-0.000
0.175	-0.362	-0.275	-0.193	-0.132	-0.091	-0.063	-0.043	-0.029	-0.018	-0.009	-0.000
0.200	-0.346	-0.270	-0.196	-0.138	-0.097	-0.068	-0.048	-0.033	-0.021	-0.010	-0.000
0.250	-0.321	-0.261	-0.198	-0.146	-0.107	-0.078	-0.056	-0.039	-0.025	-0.012	-0.000
0.300	-0.301	-0.252	-0.199	-0.152	-0.114	-0.085	-0.062	-0.044	-0.028	-0.014	-0.000
0.350	-0.285	-0.244	-0.198	-0.155	-0.119	-0.091	-0.068	-0.048	-0.031	-0.015	-0.000
0.400	-0.272	-0.236	-0.196	-0.157	-0.123	-0.095	-0.072	-0.052	-0.033	-0.016	-0.000
0.500	-0.252	-0.224	-0.191	-0.158	-0.128	-0.101	-0.078	-0.056	-0.037	-0.018	-0.000
0.600	-0.236	-0.213	-0.186	-0.157	-0.130	-0.104	-0.081	-0.059	-0.039	-0.019	-0.000
0.700	-0.223	-0.203	-0.180	-0.155	-0.130	-0.106	-0.083	-0.061	-0.040	-0.020	-0.000
0.800	-0.212	-0.195	-0.175	-0.152	-0.129	-0.106	-0.084	-0.062	-0.041	-0.020	-0.000
1.000	-0.195	-0.181	-0.165	-0.145	-0.125	-0.104	-0.083	-0.062	-0.041	-0.020	-0.000
1.250	-0.178	-0.166	-0.153	-0.136	-0.118	-0.099	-0.079	-0.059	-0.039	-0.019	-0.000
1.500	-0.163	-0.154	-0.142	-0.127	-0.111	-0.093	-0.075	-0.056	-0.037	-0.018	-0.000
1.750	-0.151	-0.142	-0.132	-0.119	-0.104	-0.087	-0.070	-0.053	-0.035	-0.017	-0.000
2.000	-0.140	-0.132	-0.123	-0.110	-0.097	-0.081	-0.066	-0.049	-0.033	-0.016	-0.000
2.500	-0.120	-0.114	-0.106	-0.096	-0.084	-0.071	-0.057	-0.043	-0.029	-0.014	-0.000
3.000	-0.103	-0.099	-0.092	-0.083	-0.073	-0.061	-0.050	-0.037	-0.025	-0.012	-0.000
3.500	-0.089	-0.085	-0.079	-0.072	-0.063	-0.053	-0.043	-0.032	-0.022	-0.011	-0.000
4.000	-0.077	-0.074	-0.069	-0.062	-0.054	-0.046	-0.037	-0.028	-0.019	-0.009	-0.000
5.000	-0.056	-0.054	-0.051	-0.046	-0.041	-0.035	-0.028	-0.021	-0.014	-0.007	-0.000
6.000	-0.041	-0.040	-0.038	-0.034	-0.030	-0.026	-0.021	-0.016	-0.011	-0.005	-0.000
7.000	-0.030	-0.029	-0.028	-0.025	-0.022	-0.019	-0.016	-0.012	-0.008	-0.004	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.564	2.262	2.100	2.518

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	[illegible]	[illegible]	[illegible] (PM)
0.005	0.010	0.908	0.991	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.889	0.984	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.015	0.010	0.870	0.978	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.020	0.010	0.852	0.972	0.993	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.030	0.010	0.817	0.959	0.988	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.961
0.040	0.010	0.786	0.945	0.982	0.993	0.997	0.999	0.999	1.000	1.000	1.000	0.957
0.050	0.010	0.757	0.932	0.976	0.990	0.996	0.998	0.999	1.000	1.000	1.000	0.953
0.060	0.010	0.730	0.919	0.970	0.987	0.994	0.997	0.998	0.999	1.000	1.000	0.948
0.080	0.010	0.682	0.892	0.957	0.980	0.990	0.995	0.997	0.998	0.999	0.999	0.943
0.100	0.010	0.641	0.866	0.943	0.973	0.986	0.992	0.995	0.997	0.998	0.998	0.935
0.125	0.010	0.597	0.835	0.926	0.963	0.980	0.988	0.993	0.995	0.996	0.997	0.929
0.150	0.010	0.560	0.806	0.908	0.952	0.973	0.984	0.990	0.993	0.994	0.995	0.921
0.175	0.010	0.528	0.779	0.890	0.941	0.966	0.979	0.986	0.990	0.992	0.992	0.914
0.200	0.010	0.500	0.754	0.873	0.930	0.959	0.974	0.982	0.987	0.989	0.990	0.908
0.250	0.010	0.453	0.708	0.839	0.907	0.943	0.963	0.974	0.980	0.982	0.983	0.895
0.300	0.010	0.416	0.668	0.807	0.883	0.926	0.950	0.964	0.971	0.975	0.975	0.883
0.350	0.010	0.386	0.633	0.778	0.861	0.909	0.937	0.953	0.962	0.966	0.967	0.872
0.400	0.010	0.361	0.601	0.750	0.839	0.892	0.923	0.942	0.951	0.956	0.957	0.861
0.500	0.010	0.320	0.548	0.700	0.796	0.857	0.894	0.917	0.929	0.934	0.935	0.840
0.600	0.010	0.290	0.505	0.656	0.757	0.823	0.865	0.890	0.904	0.910	0.912	0.821
0.700	0.010	0.265	0.469	0.618	0.721	0.791	0.835	0.863	0.878	0.885	0.886	0.803
0.800	0.010	0.246	0.439	0.584	0.688	0.759	0.806	0.835	0.851	0.859	0.860	0.786
1.000	0.010	0.215	0.389	0.526	0.627	0.700	0.749	0.780	0.797	0.805	0.806	0.752
1.250	0.010	0.186	0.341	0.465	0.563	0.633	0.682	0.713	0.731	0.738	0.740	0.716
1.500	0.010	0.165	0.303	0.417	0.507	0.573	0.620	0.650	0.667	0.675	0.676	0.681
1.750	0.010	0.147	0.271	0.375	0.458	0.520	0.564	0.592	0.608	0.615	0.617	0.649
2.000	0.010	0.133	0.244	0.339	0.414	0.471	0.512	0.538	0.554	0.560	0.562	0.618
2.500	0.010	0.109	0.200	0.278	0.340	0.388	0.423	0.445	0.458	0.464	0.465	0.561
3.000	0.010	0.091	0.165	0.229	0.281	0.321	0.349	0.368	0.379	0.384	0.385	0.510
3.500	0.010	0.076	0.137	0.189	0.232	0.265	0.289	0.305	0.314	0.319	0.320	0.465
4.000	0.010	0.064	0.114	0.157	0.193	0.220	0.240	0.253	0.261	0.264	0.265	0.424
5.000	0.010	0.046	0.079	0.109	0.133	0.152	0.165	0.175	0.180	0.183	0.184	0.353
6.000	0.010	0.034	0.056	0.076	0.093	0.106	0.115	0.122	0.126	0.128	0.129	0.297
7.000	0.010	0.026	0.041	0.055	0.066	0.075	0.081	0.086	0.089	0.090	0.090	0.251

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.005	-0.495	-0.162	-0.044	-0.010	-0.002	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.481	-0.169	-0.052	-0.016	-0.005	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.467	-0.175	-0.059	-0.021	-0.008	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000
0.020	-0.455	-0.180	-0.065	-0.025	-0.010	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.030	-0.433	-0.188	-0.075	-0.033	-0.015	-0.007	-0.003	-0.001	-0.001	-0.000	-0.000
0.040	-0.414	-0.194	-0.083	-0.039	-0.019	-0.010	-0.005	-0.003	-0.001	-0.000	-0.000
0.050	-0.398	-0.198	-0.091	-0.044	-0.023	-0.013	-0.007	-0.004	-0.002	-0.001	-0.000
0.060	-0.383	-0.201	-0.097	-0.050	-0.027	-0.015	-0.009	-0.005	-0.003	-0.001	-0.000
0.080	-0.359	-0.205	-0.107	-0.058	-0.033	-0.020	-0.012	-0.007	-0.004	-0.002	-0.000
0.100	-0.339	-0.206	-0.115	-0.066	-0.039	-0.024	-0.015	-0.010	-0.006	-0.003	-0.000
0.125	-0.318	-0.207	-0.123	-0.074	-0.046	-0.029	-0.019	-0.012	-0.007	-0.003	-0.000
0.150	-0.302	-0.206	-0.129	-0.080	-0.051	-0.034	-0.022	-0.015	-0.009	-0.004	-0.000
0.175	-0.288	-0.204	-0.133	-0.086	-0.056	-0.038	-0.026	-0.017	-0.011	-0.005	-0.000
0.200	-0.276	-0.202	-0.136	-0.090	-0.061	-0.042	-0.029	-0.019	-0.012	-0.006	-0.000
0.250	-0.257	-0.197	-0.140	-0.098	-0.068	-0.048	-0.034	-0.023	-0.015	-0.007	-0.000
0.300	-0.241	-0.193	-0.143	-0.103	-0.074	-0.053	-0.038	-0.027	-0.017	-0.008	-0.000
0.350	-0.229	-0.188	-0.144	-0.107	-0.079	-0.058	-0.042	-0.030	-0.019	-0.009	-0.000
0.400	-0.219	-0.183	-0.144	-0.110	-0.082	-0.062	-0.045	-0.032	-0.021	-0.010	-0.000
0.500	-0.203	-0.175	-0.143	-0.113	-0.088	-0.067	-0.051	-0.036	-0.023	-0.011	-0.000
0.600	-0.191	-0.168	-0.141	-0.115	-0.091	-0.071	-0.054	-0.039	-0.026	-0.012	-0.000
0.700	-0.181	-0.162	-0.139	-0.115	-0.093	-0.074	-0.057	-0.042	-0.027	-0.013	-0.000
0.800	-0.172	-0.156	-0.136	-0.114	-0.094	-0.076	-0.059	-0.043	-0.028	-0.014	-0.000
1.000	-0.159	-0.146	-0.130	-0.112	-0.094	-0.077	-0.061	-0.045	-0.029	-0.014	-0.000
1.250	-0.147	-0.136	-0.123	-0.108	-0.092	-0.076	-0.061	-0.045	-0.030	-0.015	-0.000
1.500	-0.137	-0.128	-0.117	-0.104	-0.089	-0.075	-0.060	-0.044	-0.029	-0.014	-0.000
1.750	-0.128	-0.121	-0.111	-0.099	-0.086	-0.072	-0.058	-0.043	-0.029	-0.014	-0.000
2.000	-0.121	-0.114	-0.105	-0.094	-0.082	-0.069	-0.055	-0.041	-0.027	-0.013	-0.000
2.500	-0.108	-0.102	-0.095	-0.085	-0.074	-0.063	-0.050	-0.038	-0.025	-0.012	-0.000
3.000	-0.097	-0.092	-0.085	-0.077	-0.067	-0.057	-0.046	-0.034	-0.023	-0.011	-0.000
3.500	-0.087	-0.083	-0.077	-0.069	-0.061	-0.051	-0.041	-0.031	-0.021	-0.010	-0.000
4.000	-0.078	-0.074	-0.069	-0.062	-0.055	-0.046	-0.037	-0.028	-0.019	-0.009	-0.000
5.000	-0.063	-0.060	-0.056	-0.051	-0.044	-0.038	-0.030	-0.023	-0.015	-0.008	-0.000
6.000	-0.050	-0.049	-0.045	-0.041	-0.036	-0.030	-0.025	-0.019	-0.012	-0.006	-0.000
7.000	-0.040	-0.039	-0.037	-0.033	-0.029	-0.025	-0.020	-0.015	-0.010	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.645	2.406	2.330	2.844

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.909	0.991	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.893	0.986	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.015	0.010	0.877	0.981	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.020	0.010	0.862	0.976	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.966
0.030	0.010	0.833	0.965	0.990	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.963
0.040	0.010	0.806	0.954	0.986	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.959
0.050	0.010	0.781	0.943	0.981	0.992	0.997	0.998	0.999	1.000	1.000	1.000	0.956
0.060	0.010	0.757	0.932	0.976	0.990	0.995	0.998	0.999	0.999	1.000	1.000	0.953
0.080	0.010	0.715	0.910	0.966	0.985	0.993	0.996	0.998	0.999	0.999	0.999	0.947
0.100	0.010	0.677	0.889	0.955	0.979	0.989	0.994	0.997	0.998	0.999	0.999	0.942
0.125	0.010	0.636	0.862	0.941	0.971	0.985	0.991	0.995	0.997	0.997	0.998	0.935
0.150	0.010	0.600	0.837	0.926	0.963	0.980	0.988	0.993	0.995	0.996	0.996	0.929
0.175	0.010	0.569	0.813	0.912	0.954	0.974	0.985	0.990	0.993	0.994	0.994	0.923
0.200	0.010	0.542	0.791	0.897	0.945	0.969	0.981	0.987	0.991	0.992	0.993	0.917
0.250	0.010	0.495	0.749	0.869	0.927	0.956	0.972	0.981	0.985	0.987	0.988	0.906
0.300	0.010	0.457	0.712	0.841	0.908	0.943	0.963	0.973	0.979	0.982	0.982	0.896
0.350	0.010	0.426	0.678	0.815	0.889	0.930	0.952	0.965	0.972	0.975	0.976	0.886
0.400	0.010	0.399	0.648	0.790	0.870	0.916	0.942	0.956	0.964	0.968	0.969	0.876
0.500	0.010	0.357	0.596	0.744	0.834	0.887	0.919	0.937	0.947	0.951	0.952	0.858
0.600	0.010	0.324	0.553	0.704	0.799	0.859	0.895	0.917	0.928	0.932	0.934	0.841
0.700	0.010	0.298	0.516	0.667	0.767	0.831	0.871	0.895	0.908	0.913	0.915	0.826
0.800	0.010	0.276	0.485	0.634	0.736	0.804	0.847	0.873	0.887	0.893	0.894	0.810
1.000	0.010	0.243	0.433	0.577	0.680	0.751	0.798	0.827	0.842	0.849	0.850	0.782
1.250	0.010	0.212	0.384	0.519	0.620	0.691	0.740	0.770	0.786	0.793	0.795	0.748
1.500	0.010	0.189	0.344	0.470	0.566	0.636	0.684	0.714	0.731	0.738	0.740	0.717
1.750	0.010	0.170	0.312	0.429	0.519	0.586	0.632	0.662	0.679	0.685	0.687	0.693
2.000	0.010	0.155	0.285	0.392	0.477	0.540	0.584	0.612	0.628	0.635	0.636	0.661
2.500	0.010	0.130	0.239	0.331	0.404	0.459	0.498	0.523	0.537	0.544	0.545	0.609
3.000	0.010	0.111	0.203	0.281	0.344	0.391	0.425	0.447	0.459	0.465	0.466	0.563
3.500	0.010	0.095	0.173	0.239	0.293	0.334	0.363	0.382	0.392	0.397	0.398	0.520
4.000	0.010	0.082	0.148	0.204	0.250	0.285	0.310	0.326	0.336	0.340	0.341	0.481
5.000	0.010	0.061	0.109	0.149	0.183	0.208	0.226	0.239	0.246	0.249	0.249	0.412
6.000	0.010	0.047	0.081	0.110	0.134	0.153	0.166	0.175	0.181	0.183	0.184	0.355
7.000	0.010	0.036	0.061	0.082	0.099	0.113	0.123	0.130	0.134	0.135	0.136	0.305

SLIP COEFF(B)= 0.200   INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.005	-0.405	-0.133	-0.037	-0.009	-0.002	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.396	-0.138	-0.042	-0.013	-0.004	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.386	-0.142	-0.047	-0.017	-0.006	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000
0.020	-0.378	-0.146	-0.051	-0.020	-0.008	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000
0.030	-0.362	-0.152	-0.059	-0.025	-0.011	-0.005	-0.003	-0.001	-0.000	-0.000	-0.000
0.040	-0.349	-0.157	-0.065	-0.030	-0.015	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000
0.050	-0.337	-0.160	-0.070	-0.034	-0.017	-0.009	-0.005	-0.003	-0.001	-0.001	-0.000
0.060	-0.326	-0.163	-0.075	-0.037	-0.020	-0.011	-0.006	-0.004	-0.002	-0.001	-0.000
0.080	-0.307	-0.167	-0.083	-0.044	-0.025	-0.015	-0.009	-0.005	-0.003	-0.001	-0.000
0.100	-0.291	-0.169	-0.090	-0.050	-0.029	-0.018	-0.011	-0.007	-0.004	-0.002	-0.000
0.125	-0.275	-0.170	-0.096	-0.056	-0.034	-0.021	-0.014	-0.009	-0.005	-0.003	-0.000
0.150	-0.262	-0.170	-0.101	-0.061	-0.038	-0.025	-0.016	-0.011	-0.007	-0.003	-0.000
0.175	-0.250	-0.170	-0.105	-0.065	-0.042	-0.028	-0.019	-0.012	-0.008	-0.004	-0.000
0.200	-0.240	-0.169	-0.108	-0.069	-0.046	-0.031	-0.021	-0.014	-0.009	-0.004	-0.000
0.250	-0.224	-0.166	-0.113	-0.076	-0.051	-0.036	-0.025	-0.017	-0.011	-0.005	-0.000
0.300	-0.211	-0.163	-0.116	-0.081	-0.056	-0.040	-0.028	-0.019	-0.012	-0.006	-0.000
0.350	-0.201	-0.160	-0.117	-0.084	-0.060	-0.044	-0.031	-0.022	-0.014	-0.007	-0.000
0.400	-0.192	-0.156	-0.118	-0.087	-0.064	-0.047	-0.034	-0.024	-0.015	-0.007	-0.000
0.500	-0.178	-0.150	-0.119	-0.091	-0.069	-0.052	-0.038	-0.027	-0.018	-0.009	-0.000
0.600	-0.168	-0.145	-0.118	-0.093	-0.073	-0.056	-0.042	-0.030	-0.019	-0.009	-0.000
0.700	-0.159	-0.140	-0.117	-0.095	-0.075	-0.058	-0.044	-0.032	-0.021	-0.010	-0.000
0.800	-0.152	-0.136	-0.115	-0.095	-0.077	-0.060	-0.046	-0.034	-0.022	-0.011	-0.000
1.000	-0.141	-0.128	-0.112	-0.094	-0.078	-0.063	-0.049	-0.036	-0.024	-0.011	-0.000
1.250	-0.130	-0.120	-0.107	-0.092	-0.078	-0.064	-0.050	-0.037	-0.024	-0.012	-0.000
1.500	-0.121	-0.113	-0.102	-0.090	-0.077	-0.063	-0.050	-0.037	-0.025	-0.012	-0.000
1.750	-0.115	-0.107	-0.098	-0.087	-0.074	-0.062	-0.049	-0.037	-0.024	-0.012	-0.000
2.000	-0.109	-0.102	-0.094	-0.083	-0.072	-0.060	-0.048	-0.036	-0.024	-0.012	-0.000
2.500	-0.098	-0.093	-0.086	-0.077	-0.067	-0.056	-0.045	-0.034	-0.022	-0.011	-0.000
3.000	-0.090	-0.085	-0.079	-0.071	-0.062	-0.052	-0.042	-0.031	-0.021	-0.010	-0.000
3.500	-0.082	-0.078	-0.072	-0.065	-0.057	-0.048	-0.039	-0.029	-0.019	-0.009	-0.000
4.000	-0.075	-0.072	-0.066	-0.060	-0.052	-0.044	-0.036	-0.027	-0.018	-0.009	-0.000
5.000	-0.063	-0.060	-0.056	-0.050	-0.044	-0.037	-0.030	-0.023	-0.015	-0.007	-0.000
6.000	-0.053	-0.050	-0.047	-0.042	-0.037	-0.031	-0.025	-0.019	-0.013	-0.006	-0.000
7.000	-0.044	-0.042	-0.039	-0.036	-0.031	-0.026	-0.021	-0.016	-0.011	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.679	2.469	2.400	2.897

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.910	0.991	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.896	0.987	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.015	0.010	0.882	0.982	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.020	0.010	0.869	0.978	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.967
0.030	0.010	0.843	0.969	0.991	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.964
0.040	0.010	0.819	0.959	0.988	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.961
0.050	0.010	0.796	0.950	0.984	0.994	0.997	0.999	0.999	1.000	1.000	1.000	0.959
0.060	0.010	0.775	0.940	0.980	0.992	0.996	0.998	0.999	1.000	1.000	1.000	0.955
0.080	0.010	0.736	0.921	0.971	0.988	0.994	0.997	0.998	0.999	0.999	0.999	0.950
0.100	0.010	0.701	0.902	0.962	0.983	0.991	0.995	0.997	0.998	0.999	0.999	0.945
0.125	0.010	0.662	0.879	0.950	0.976	0.988	0.993	0.996	0.997	0.998	0.999	0.939
0.150	0.010	0.628	0.857	0.938	0.969	0.984	0.990	0.994	0.996	0.997	0.997	0.934
0.175	0.010	0.598	0.835	0.925	0.962	0.979	0.988	0.992	0.994	0.995	0.996	0.928
0.200	0.010	0.571	0.815	0.913	0.955	0.974	0.984	0.990	0.992	0.994	0.994	0.923
0.250	0.010	0.525	0.776	0.887	0.939	0.964	0.977	0.985	0.988	0.990	0.990	0.913
0.300	0.010	0.487	0.741	0.863	0.923	0.953	0.970	0.979	0.983	0.985	0.986	0.904
0.350	0.010	0.455	0.709	0.839	0.906	0.942	0.961	0.972	0.978	0.980	0.981	0.895
0.400	0.010	0.428	0.680	0.816	0.890	0.930	0.952	0.965	0.971	0.974	0.975	0.886
0.500	0.010	0.384	0.629	0.774	0.857	0.905	0.933	0.949	0.958	0.961	0.962	0.870
0.600	0.010	0.349	0.586	0.736	0.826	0.881	0.913	0.932	0.942	0.946	0.947	0.854
0.700	0.010	0.322	0.550	0.701	0.796	0.856	0.892	0.914	0.925	0.930	0.931	0.840
0.800	0.010	0.299	0.518	0.669	0.768	0.832	0.871	0.895	0.907	0.912	0.914	0.826
1.000	0.010	0.264	0.466	0.614	0.716	0.785	0.829	0.855	0.870	0.876	0.877	0.800
1.250	0.010	0.231	0.415	0.556	0.658	0.729	0.776	0.805	0.821	0.827	0.829	0.769
1.500	0.010	0.207	0.375	0.508	0.607	0.678	0.726	0.756	0.772	0.779	0.780	0.741
1.750	0.010	0.188	0.342	0.467	0.562	0.631	0.678	0.708	0.724	0.731	0.732	0.714
2.000	0.010	0.172	0.314	0.430	0.521	0.587	0.633	0.662	0.678	0.684	0.686	0.690
2.500	0.010	0.146	0.268	0.369	0.449	0.509	0.551	0.578	0.592	0.599	0.600	0.641
3.000	0.010	0.126	0.231	0.319	0.389	0.442	0.479	0.503	0.517	0.522	0.523	0.599
3.500	0.010	0.109	0.200	0.276	0.338	0.384	0.417	0.438	0.450	0.455	0.456	0.559
4.000	0.010	0.096	0.174	0.240	0.294	0.334	0.363	0.382	0.392	0.397	0.398	0.521
5.000	0.010	0.074	0.132	0.182	0.223	0.253	0.275	0.290	0.298	0.301	0.302	0.454
6.000	0.010	0.058	0.101	0.139	0.169	0.193	0.210	0.221	0.227	0.230	0.230	0.397
7.000	0.010	0.045	0.078	0.107	0.130	0.147	0.160	0.169	0.173	0.176	0.176	0.348

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.005	-0.352	-0.116	-0.032	-0.008	-0.002	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.344	-0.120	-0.036	-0.011	-0.004	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.337	-0.123	-0.040	-0.014	-0.005	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000
0.020	-0.331	-0.126	-0.044	-0.016	-0.007	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000
0.030	-0.319	-0.131	-0.049	-0.021	-0.009	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.040	-0.308	-0.135	-0.054	-0.024	-0.012	-0.006	-0.003	-0.002	-0.001	-0.000	-0.000
0.050	-0.298	-0.138	-0.059	-0.028	-0.014	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000
0.060	-0.290	-0.140	-0.063	-0.031	-0.016	-0.009	-0.005	-0.003	-0.002	-0.001	-0.000
0.080	-0.274	-0.144	-0.070	-0.036	-0.020	-0.012	-0.007	-0.004	-0.002	-0.001	-0.000
0.100	-0.261	-0.146	-0.075	-0.041	-0.023	-0.014	-0.009	-0.006	-0.003	-0.002	-0.000
0.125	-0.248	-0.147	-0.081	-0.046	-0.027	-0.017	-0.011	-0.007	-0.004	-0.002	-0.000
0.150	-0.236	-0.148	-0.085	-0.050	-0.031	-0.020	-0.013	-0.008	-0.005	-0.002	-0.000
0.175	-0.226	-0.148	-0.089	-0.054	-0.034	-0.022	-0.015	-0.010	-0.006	-0.003	-0.000
0.200	-0.218	-0.148	-0.092	-0.057	-0.037	-0.025	-0.017	-0.011	-0.007	-0.003	-0.000
0.250	-0.203	-0.146	-0.096	-0.063	-0.042	-0.029	-0.020	-0.013	-0.008	-0.004	-0.000
0.300	-0.192	-0.144	-0.099	-0.067	-0.046	-0.032	-0.023	-0.016	-0.010	-0.005	-0.000
0.350	-0.183	-0.141	-0.101	-0.071	-0.050	-0.035	-0.025	-0.017	-0.011	-0.005	-0.000
0.400	-0.175	-0.139	-0.102	-0.073	-0.053	-0.038	-0.027	-0.019	-0.012	-0.006	-0.000
0.500	-0.162	-0.134	-0.104	-0.077	-0.058	-0.043	-0.031	-0.022	-0.014	-0.007	-0.000
0.600	-0.153	-0.130	-0.104	-0.080	-0.061	-0.046	-0.034	-0.025	-0.016	-0.008	-0.000
0.700	-0.145	-0.126	-0.103	-0.082	-0.064	-0.049	-0.037	-0.027	-0.017	-0.008	-0.000
0.800	-0.139	-0.122	-0.102	-0.082	-0.065	-0.051	-0.039	-0.028	-0.018	-0.009	-0.000
1.000	-0.128	-0.116	-0.099	-0.083	-0.067	-0.054	-0.042	-0.030	-0.020	-0.010	-0.000
1.250	-0.119	-0.109	-0.096	-0.082	-0.068	-0.055	-0.043	-0.032	-0.021	-0.010	-0.000
1.500	-0.111	-0.103	-0.092	-0.080	-0.068	-0.056	-0.044	-0.033	-0.021	-0.010	-0.000
1.750	-0.105	-0.098	-0.089	-0.078	-0.067	-0.055	-0.044	-0.033	-0.021	-0.010	-0.000
2.000	-0.100	-0.094	-0.086	-0.076	-0.065	-0.054	-0.043	-0.032	-0.021	-0.010	-0.000
2.500	-0.091	-0.086	-0.079	-0.071	-0.061	-0.051	-0.041	-0.031	-0.020	-0.010	-0.000
3.000	-0.084	-0.080	-0.074	-0.066	-0.057	-0.048	-0.039	-0.029	-0.019	-0.009	-0.000
3.500	-0.078	-0.074	-0.068	-0.061	-0.054	-0.045	-0.036	-0.027	-0.018	-0.009	-0.000
4.000	-0.072	-0.068	-0.063	-0.057	-0.050	-0.042	-0.034	-0.025	-0.017	-0.008	-0.000
5.000	-0.061	-0.059	-0.054	-0.049	-0.043	-0.036	-0.029	-0.022	-0.015	-0.007	-0.000
6.000	-0.053	-0.050	-0.047	-0.042	-0.037	-0.031	-0.025	-0.019	-0.013	-0.006	-0.000
7.000	-0.045	-0.043	-0.040	-0.036	-0.032	-0.027	-0.022	-0.016	-0.011	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.700	2.507	2.434	2.900

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.910	0.991	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.897	0.987	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.015	0.010	0.885	0.983	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.020	0.010	0.873	0.979	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.030	0.010	0.850	0.971	0.992	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.040	0.010	0.828	0.963	0.989	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.962
0.050	0.010	0.807	0.955	0.986	0.995	0.998	0.999	0.999	1.000	1.000	1.000	0.959
0.060	0.010	0.787	0.946	0.982	0.993	0.997	0.998	0.999	1.000	1.000	1.000	0.957
0.080	0.010	0.751	0.929	0.975	0.989	0.995	0.997	0.999	0.999	0.999	1.000	0.952
0.100	0.010	0.718	0.912	0.967	0.985	0.993	0.996	0.998	0.999	0.999	0.999	0.948
0.125	0.010	0.681	0.891	0.956	0.980	0.989	0.994	0.996	0.998	0.998	0.998	0.942
0.150	0.010	0.648	0.871	0.945	0.974	0.986	0.992	0.995	0.997	0.997	0.997	0.937
0.175	0.010	0.619	0.851	0.934	0.967	0.982	0.989	0.993	0.995	0.996	0.996	0.932
0.200	0.010	0.593	0.832	0.923	0.961	0.978	0.987	0.991	0.994	0.995	0.995	0.927
0.250	0.010	0.547	0.795	0.900	0.947	0.969	0.981	0.987	0.990	0.992	0.992	0.918
0.300	0.010	0.510	0.762	0.878	0.933	0.960	0.974	0.982	0.986	0.988	0.988	0.909
0.350	0.010	0.478	0.732	0.856	0.918	0.950	0.967	0.976	0.981	0.983	0.984	0.901
0.400	0.010	0.450	0.704	0.835	0.903	0.940	0.959	0.970	0.976	0.979	0.979	0.893
0.500	0.010	0.405	0.655	0.796	0.874	0.918	0.943	0.957	0.964	0.967	0.968	0.878
0.600	0.010	0.370	0.612	0.759	0.845	0.896	0.925	0.942	0.951	0.955	0.955	0.864
0.700	0.010	0.342	0.576	0.726	0.818	0.874	0.907	0.926	0.936	0.941	0.942	0.850
0.800	0.010	0.318	0.545	0.695	0.791	0.851	0.888	0.910	0.921	0.926	0.927	0.837
1.000	0.010	0.281	0.492	0.641	0.742	0.809	0.850	0.875	0.889	0.894	0.895	0.813
1.250	0.010	0.247	0.440	0.585	0.687	0.757	0.802	0.830	0.845	0.851	0.852	0.785
1.500	0.010	0.222	0.399	0.537	0.638	0.709	0.756	0.785	0.801	0.807	0.808	0.759
1.750	0.010	0.202	0.366	0.496	0.594	0.664	0.711	0.741	0.757	0.763	0.764	0.733
2.000	0.010	0.185	0.337	0.460	0.554	0.622	0.669	0.698	0.714	0.720	0.722	0.709
2.500	0.010	0.158	0.290	0.399	0.484	0.547	0.591	0.618	0.633	0.640	0.641	0.665
3.000	0.010	0.138	0.253	0.349	0.425	0.482	0.521	0.546	0.560	0.566	0.567	0.624
3.500	0.010	0.121	0.222	0.306	0.374	0.424	0.460	0.483	0.495	0.500	0.501	0.586
4.000	0.010	0.107	0.195	0.269	0.329	0.374	0.406	0.426	0.437	0.442	0.443	0.550
5.000	0.010	0.084	0.152	0.210	0.256	0.291	0.316	0.332	0.341	0.345	0.346	0.484
6.000	0.010	0.067	0.119	0.164	0.200	0.227	0.247	0.259	0.266	0.269	0.270	0.430
7.000	0.010	0.054	0.094	0.128	0.156	0.178	0.193	0.203	0.209	0.211	0.212	0.382

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.005	-0.315	-0.104	-0.029	-0.007	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.309	-0.107	-0.033	-0.010	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.303	-0.110	-0.036	-0.012	-0.005	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000
0.020	-0.298	-0.112	-0.038	-0.014	-0.006	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000
0.030	-0.288	-0.116	-0.043	-0.018	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.040	-0.279	-0.120	-0.047	-0.021	-0.010	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.050	-0.271	-0.122	-0.051	-0.024	-0.012	-0.006	-0.004	-0.002	-0.001	-0.000	-0.000
0.060	-0.264	-0.125	-0.055	-0.026	-0.014	-0.008	-0.004	-0.002	-0.001	-0.001	-0.000
0.080	-0.251	-0.128	-0.060	-0.031	-0.017	-0.010	-0.006	-0.004	-0.002	-0.001	-0.000
0.100	-0.239	-0.130	-0.065	-0.035	-0.020	-0.012	-0.007	-0.005	-0.003	-0.001	-0.000
0.125	-0.228	-0.132	-0.070	-0.039	-0.023	-0.014	-0.009	-0.006	-0.004	-0.002	-0.000
0.150	-0.217	-0.133	-0.074	-0.043	-0.026	-0.017	-0.011	-0.007	-0.004	-0.002	-0.000
0.175	-0.209	-0.133	-0.078	-0.046	-0.029	-0.019	-0.012	-0.008	-0.005	-0.002	-0.000
0.200	-0.201	-0.133	-0.080	-0.049	-0.031	-0.021	-0.014	-0.009	-0.006	-0.003	-0.000
0.250	-0.188	-0.132	-0.085	-0.054	-0.036	-0.024	-0.017	-0.011	-0.007	-0.003	-0.000
0.300	-0.178	-0.130	-0.088	-0.058	-0.039	-0.027	-0.019	-0.013	-0.008	-0.004	-0.000
0.350	-0.170	-0.129	-0.090	-0.061	-0.043	-0.030	-0.021	-0.015	-0.009	-0.004	-0.000
0.400	-0.163	-0.127	-0.091	-0.064	-0.045	-0.032	-0.023	-0.016	-0.010	-0.005	-0.000
0.500	-0.151	-0.123	-0.093	-0.068	-0.050	-0.037	-0.027	-0.019	-0.012	-0.006	-0.000
0.600	-0.142	-0.119	-0.093	-0.071	-0.053	-0.040	-0.029	-0.021	-0.013	-0.006	-0.000
0.700	-0.135	-0.116	-0.093	-0.072	-0.056	-0.042	-0.032	-0.023	-0.015	-0.007	-0.000
0.800	-0.129	-0.112	-0.092	-0.073	-0.058	-0.044	-0.034	-0.024	-0.016	-0.008	-0.000
1.000	-0.120	-0.107	-0.091	-0.074	-0.060	-0.047	-0.036	-0.026	-0.017	-0.008	-0.000
1.250	-0.111	-0.101	-0.088	-0.074	-0.061	-0.049	-0.038	-0.028	-0.018	-0.009	-0.000
1.500	-0.104	-0.096	-0.085	-0.073	-0.061	-0.050	-0.039	-0.029	-0.019	-0.009	-0.000
1.750	-0.098	-0.091	-0.082	-0.072	-0.061	-0.050	-0.039	-0.029	-0.019	-0.009	-0.000
2.000	-0.094	-0.088	-0.079	-0.070	-0.060	-0.049	-0.039	-0.029	-0.019	-0.009	-0.000
2.500	-0.086	-0.081	-0.074	-0.066	-0.057	-0.048	-0.038	-0.028	-0.019	-0.009	-0.000
3.000	-0.079	-0.075	-0.069	-0.062	-0.054	-0.045	-0.036	-0.027	-0.018	-0.009	-0.000
3.500	-0.074	-0.070	-0.065	-0.058	-0.051	-0.043	-0.034	-0.026	-0.017	-0.008	-0.000
4.000	-0.069	-0.065	-0.061	-0.054	-0.047	-0.040	-0.032	-0.024	-0.016	-0.008	-0.000
5.000	-0.060	-0.057	-0.053	-0.048	-0.042	-0.035	-0.028	-0.021	-0.014	-0.007	-0.000
6.000	-0.052	-0.050	-0.046	-0.042	-0.036	-0.031	-0.025	-0.019	-0.012	-0.006	-0.000
7.000	-0.045	-0.043	-0.040	-0.036	-0.032	-0.027	-0.022	-0.016	-0.011	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.713	2.534	2.454	2.889

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 0.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.812	0.964	0.993	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.961
0.010	0.010	0.513	0.851	0.960	0.990	0.998	0.999	1.000	1.000	1.000	1.000	0.923
0.015	0.010	0.379	0.717	0.897	0.968	0.991	0.997	0.999	1.000	1.000	1.000	0.902
0.020	0.010	0.328	0.625	0.826	0.931	0.976	0.992	0.998	0.999	1.000	1.000	0.883
0.030	0.010	0.247	0.510	0.714	0.850	0.930	0.970	0.988	0.995	0.998	0.999	0.852
0.040	0.010	0.210	0.436	0.632	0.778	0.876	0.936	0.969	0.986	0.993	0.995	0.826
0.050	0.010	0.180	0.386	0.571	0.718	0.826	0.899	0.945	0.971	0.984	0.987	0.804
0.060	0.010	0.162	0.348	0.522	0.668	0.781	0.862	0.917	0.951	0.969	0.974	0.734
0.080	0.010	0.134	0.294	0.450	0.589	0.704	0.793	0.859	0.903	0.929	0.937	0.748
0.100	0.010	0.117	0.257	0.399	0.529	0.641	0.732	0.802	0.851	0.879	0.889	0.717
0.125	0.010	0.102	0.224	0.351	0.471	0.576	0.665	0.735	0.785	0.815	0.825	0.682
0.150	0.010	0.091	0.200	0.314	0.424	0.523	0.606	0.673	0.722	0.751	0.761	0.651
0.175	0.010	0.082	0.180	0.284	0.385	0.476	0.555	0.617	0.663	0.691	0.701	0.622
0.200	0.010	0.076	0.164	0.259	0.351	0.436	0.508	0.567	0.610	0.636	0.645	0.594
0.250	0.010	0.064	0.138	0.218	0.296	0.368	0.430	0.481	0.518	0.541	0.549	0.549
0.300	0.010	0.056	0.118	0.185	0.252	0.313	0.367	0.411	0.443	0.462	0.469	0.507
0.350	0.010	0.049	0.102	0.159	0.216	0.269	0.315	0.353	0.381	0.398	0.403	0.471
0.400	0.010	0.044	0.089	0.138	0.187	0.233	0.273	0.305	0.329	0.344	0.349	0.439
0.500	0.010	0.036	0.069	0.106	0.143	0.177	0.207	0.232	0.259	0.262	0.265	0.394
0.600	0.010	0.030	0.056	0.083	0.111	0.138	0.161	0.180	0.194	0.202	0.206	0.343
0.700	0.010	0.026	0.046	0.067	0.089	0.109	0.127	0.142	0.153	0.160	0.162	0.304
0.800	0.010	0.023	0.038	0.055	0.072	0.088	0.102	0.114	0.123	0.128	0.130	0.275
1.000	0.010	0.019	0.029	0.039	0.050	0.060	0.069	0.077	0.082	0.086	0.087	0.223
1.250	0.010	0.016	0.022	0.028	0.034	0.040	0.046	0.050	0.053	0.055	0.056	0.190
1.500	0.010	0.014	0.018	0.022	0.026	0.029	0.033	0.035	0.037	0.039	0.039	0.164
1.750	0.010	0.013	0.015	0.018	0.020	0.023	0.025	0.027	0.028	0.029	0.029	0.145
2.000	0.010	0.012	0.014	0.015	0.017	0.019	0.020	0.021	0.022	0.022	0.023	0.133
2.500	0.010	0.011	0.012	0.013	0.013	0.014	0.015	0.015	0.016	0.016	0.016	0.117
3.000	0.010	0.010	0.011	0.011	0.012	0.012	0.012	0.013	0.013	0.013	0.013	0.109
3.500	0.010	0.010	0.010	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.105
4.000	0.010	0.010	0.010	0.010	0.010	0.011	0.011	0.011	0.011	0.011	0.011	0.102
5.000	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.101
6.000	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.100
7.000	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.100

SLIP COEFF(B)= 0.400   INERTIAL COEFF(BB)= 0.000

FLOWRATE DISTRIBUTION

0.005	-36.524	-2.324	-0.433	-0.082	-0.015	-0.002	0.0	0.001	-0.000	-0.000	-0.000
0.010	-6.839	-3.945	-1.367	-0.387	-0.099	-0.022	-0.005	0.0	0.001	-0.000	-0.000
0.015	-8.861	-3.145	-1.904	-0.799	-0.276	-0.083	-0.023	-0.006	0.0	0.001	-0.000
0.020	-5.864	-2.838	-1.908	-1.067	-0.482	-0.186	-0.063	-0.019	-0.005	0.0	-0.000
0.030	-4.589	-2.460	-1.840	-1.248	-0.755	-0.399	-0.187	-0.079	-0.030	-0.010	-0.000
0.040	-3.418	-2.139	-1.745	-1.287	-0.876	-0.550	-0.314	-0.163	-0.076	-0.029	-0.000
0.050	-3.036	-1.974	-1.631	-1.280	-0.937	-0.642	-0.411	-0.243	-0.130	-0.055	-0.000
0.060	-2.576	-1.793	-1.552	-1.252	-0.961	-0.699	-0.479	-0.307	-0.177	-0.080	-0.000
0.080	-2.139	-1.591	-1.398	-1.189	-0.967	-0.752	-0.558	-0.389	-0.243	-0.115	-0.000
0.100	-1.795	-1.412	-1.289	-1.120	-0.942	-0.762	-0.588	-0.426	-0.276	-0.135	-0.000
0.125	-1.574	-1.284	-1.168	-1.042	-0.895	-0.744	-0.590	-0.438	-0.289	-0.143	-0.000
0.150	-1.368	-1.156	-1.080	-0.969	-0.845	-0.711	-0.571	-0.429	-0.286	-0.143	-0.000
0.175	-1.251	-1.078	-0.996	-0.905	-0.794	-0.673	-0.544	-0.411	-0.275	-0.137	-0.000
0.200	-1.124	-0.987	-0.930	-0.843	-0.744	-0.633	-0.514	-0.390	-0.262	-0.131	-0.000
0.250	-0.964	-0.868	-0.809	-0.739	-0.655	-0.560	-0.457	-0.348	-0.233	-0.117	-0.000
0.300	-0.817	-0.752	-0.714	-0.651	-0.579	-0.495	-0.405	-0.308	-0.207	-0.104	-0.000
0.350	-0.723	-0.674	-0.630	-0.579	-0.513	-0.440	-0.360	-0.274	-0.185	-0.093	-0.000
0.400	-0.625	-0.590	-0.563	-0.515	-0.458	-0.393	-0.321	-0.245	-0.164	-0.082	-0.000
0.500	-0.504	-0.480	-0.449	-0.414	-0.369	-0.317	-0.258	-0.198	-0.132	-0.067	-0.000
0.600	-0.393	-0.382	-0.367	-0.337	-0.301	-0.259	-0.211	-0.161	-0.110	-0.054	-0.000
0.700	-0.332	-0.322	-0.300	-0.278	-0.248	-0.214	-0.176	-0.134	-0.091	-0.045	-0.000
0.800	-0.264	-0.259	-0.252	-0.231	-0.207	-0.179	-0.147	-0.112	-0.076	-0.038	-0.000
1.000	-0.196	-0.190	-0.175	-0.164	-0.146	-0.127	-0.104	-0.080	-0.054	-0.027	-0.000
1.250	-0.120	-0.119	-0.119	-0.109	-0.098	-0.085	-0.070	-0.054	-0.036	-0.018	-0.000
1.500	-0.092	-0.089	-0.079	-0.075	-0.067	-0.059	-0.048	-0.037	-0.025	-0.013	-0.000
1.750	-0.054	-0.054	-0.058	-0.052	-0.047	-0.041	-0.034	-0.026	-0.018	-0.009	-0.000
2.000	-0.048	-0.046	-0.038	-0.037	-0.033	-0.029	-0.024	-0.018	-0.013	-0.006	-0.000
2.500	-0.016	-0.016	-0.022	-0.018	-0.017	-0.014	-0.012	-0.009	-0.006	-0.003	-0.000
3.000	-0.016	-0.015	-0.009	-0.010	-0.009	-0.008	-0.006	-0.005	-0.003	-0.002	-0.000
3.500	-0.001	-0.001	-0.007	-0.004	-0.004	-0.004	-0.003	-0.003	-0.002	-0.001	-0.000
4.000	-0.008	-0.007	-0.001	-0.003	-0.002	-0.002	-0.002	-0.001	-0.001	-0.000	-0.000
5.000	-0.000	-0.000	-0.002	-0.000	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
6.000	-0.005	-0.005	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
7.000	-0.000	-0.000	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	34.090	88.011	-695.811	-168.220

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME	DISTANCE(X)=											PMEAN
(TD)	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	(PM)
0.005	0.010	0.892	0.987	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.010	0.010	0.865	0.978	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.966
0.015	0.010	0.840	0.969	0.992	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.963
0.020	0.010	0.816	0.959	0.988	0.996	0.999	0.999	1.000	1.000	1.000	1.000	0.961
0.030	0.010	0.772	0.940	0.980	0.992	0.997	0.999	0.999	1.000	1.000	1.000	0.955
0.040	0.010	0.733	0.921	0.972	0.988	0.995	0.998	0.999	0.999	1.000	1.000	0.950
0.050	0.010	0.699	0.902	0.963	0.984	0.992	0.996	0.998	0.999	0.999	1.000	0.945
0.060	0.010	0.667	0.884	0.953	0.979	0.989	0.994	0.997	0.998	0.999	0.999	0.940
0.080	0.010	0.613	0.848	0.933	0.968	0.983	0.991	0.995	0.997	0.998	0.998	0.932
0.100	0.010	0.569	0.814	0.913	0.956	0.976	0.986	0.991	0.994	0.996	0.996	0.923
0.125	0.010	0.523	0.775	0.888	0.940	0.966	0.979	0.987	0.991	0.993	0.993	0.913
0.150	0.010	0.485	0.740	0.863	0.924	0.955	0.972	0.981	0.986	0.989	0.989	0.904
0.175	0.010	0.453	0.708	0.840	0.908	0.944	0.964	0.975	0.981	0.984	0.985	0.895
0.200	0.010	0.426	0.679	0.817	0.891	0.932	0.955	0.969	0.976	0.979	0.980	0.887
0.250	0.010	0.382	0.628	0.775	0.859	0.908	0.937	0.954	0.963	0.967	0.968	0.871
0.300	0.010	0.347	0.586	0.736	0.828	0.884	0.918	0.937	0.948	0.954	0.955	0.854
0.350	0.010	0.320	0.549	0.701	0.798	0.860	0.897	0.920	0.933	0.938	0.940	0.842
0.400	0.010	0.297	0.517	0.670	0.770	0.836	0.877	0.902	0.916	0.922	0.924	0.828
0.500	0.010	0.262	0.465	0.614	0.719	0.789	0.835	0.864	0.880	0.887	0.889	0.802
0.600	0.010	0.235	0.424	0.568	0.672	0.746	0.795	0.825	0.843	0.850	0.852	0.771
0.700	0.010	0.214	0.389	0.527	0.631	0.704	0.755	0.787	0.805	0.813	0.815	0.756
0.800	0.010	0.197	0.361	0.492	0.593	0.666	0.716	0.749	0.767	0.775	0.777	0.734
1.000	0.010	0.170	0.313	0.432	0.526	0.595	0.644	0.676	0.694	0.702	0.704	0.694
1.250	0.010	0.145	0.268	0.372	0.455	0.518	0.563	0.593	0.610	0.617	0.619	0.647
1.500	0.010	0.125	0.232	0.322	0.396	0.452	0.493	0.519	0.535	0.542	0.543	0.605
1.750	0.010	0.109	0.201	0.281	0.345	0.395	0.431	0.454	0.468	0.474	0.476	0.566
2.000	0.010	0.096	0.176	0.245	0.302	0.345	0.377	0.398	0.410	0.416	0.417	0.529
2.500	0.010	0.074	0.135	0.187	0.231	0.264	0.289	0.305	0.315	0.319	0.320	0.464
3.000	0.010	0.058	0.104	0.144	0.177	0.203	0.222	0.234	0.242	0.245	0.246	0.407
3.500	0.010	0.046	0.081	0.111	0.137	0.156	0.171	0.181	0.187	0.190	0.190	0.353
4.000	0.010	0.037	0.064	0.087	0.106	0.121	0.132	0.140	0.145	0.147	0.147	0.317
5.000	0.010	0.025	0.040	0.053	0.064	0.073	0.080	0.084	0.087	0.089	0.089	0.249
6.000	0.010	0.019	0.027	0.034	0.040	0.046	0.049	0.052	0.054	0.055	0.055	0.199
7.000	0.010	0.015	0.019	0.023	0.027	0.030	0.032	0.033	0.034	0.035	0.035	0.162

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.005	-0.684	-0.236	-0.069	-0.018	-0.004	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.657	-0.247	-0.082	-0.028	-0.009	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000
0.015	-0.633	-0.257	-0.094	-0.036	-0.014	-0.006	-0.002	-0.001	-0.000	-0.000	-0.000
0.020	-0.612	-0.264	-0.104	-0.044	-0.019	-0.008	-0.003	-0.001	-0.000	-0.000	-0.000
0.030	-0.575	-0.275	-0.120	-0.056	-0.027	-0.014	-0.007	-0.003	-0.001	-0.001	-0.000
0.040	-0.545	-0.282	-0.134	-0.066	-0.035	-0.019	-0.010	-0.005	-0.003	-0.001	-0.000
0.050	-0.519	-0.286	-0.144	-0.076	-0.042	-0.024	-0.014	-0.008	-0.004	-0.002	-0.000
0.060	-0.497	-0.289	-0.154	-0.084	-0.048	-0.028	-0.017	-0.010	-0.005	-0.002	-0.000
0.080	-0.461	-0.291	-0.168	-0.098	-0.059	-0.036	-0.023	-0.014	-0.008	-0.004	-0.000
0.100	-0.432	-0.290	-0.178	-0.109	-0.068	-0.044	-0.029	-0.018	-0.011	-0.005	-0.000
0.125	-0.404	-0.286	-0.186	-0.120	-0.078	-0.052	-0.035	-0.023	-0.014	-0.007	-0.000
0.150	-0.381	-0.282	-0.192	-0.129	-0.087	-0.059	-0.041	-0.027	-0.017	-0.008	-0.000
0.175	-0.363	-0.278	-0.196	-0.136	-0.094	-0.066	-0.046	-0.031	-0.020	-0.009	-0.000
0.200	-0.347	-0.273	-0.199	-0.141	-0.100	-0.071	-0.050	-0.035	-0.022	-0.011	-0.000
0.250	-0.322	-0.263	-0.202	-0.149	-0.110	-0.080	-0.058	-0.041	-0.026	-0.013	-0.000
0.300	-0.303	-0.255	-0.202	-0.155	-0.117	-0.088	-0.065	-0.046	-0.029	-0.014	-0.000
0.350	-0.287	-0.247	-0.201	-0.158	-0.122	-0.093	-0.070	-0.050	-0.032	-0.016	-0.000
0.400	-0.274	-0.239	-0.199	-0.160	-0.126	-0.098	-0.074	-0.053	-0.034	-0.017	-0.000
0.500	-0.253	-0.227	-0.194	-0.161	-0.130	-0.103	-0.080	-0.058	-0.038	-0.018	-0.000
0.600	-0.238	-0.216	-0.189	-0.160	-0.132	-0.107	-0.083	-0.061	-0.040	-0.019	-0.000
0.700	-0.225	-0.206	-0.183	-0.158	-0.132	-0.108	-0.085	-0.063	-0.041	-0.020	-0.000
0.800	-0.214	-0.198	-0.178	-0.155	-0.131	-0.108	-0.085	-0.063	-0.042	-0.020	-0.000
1.000	-0.197	-0.184	-0.167	-0.148	-0.127	-0.106	-0.084	-0.063	-0.042	-0.020	-0.000
1.250	-0.179	-0.169	-0.155	-0.139	-0.120	-0.101	-0.081	-0.061	-0.040	-0.020	-0.000
1.500	-0.165	-0.156	-0.144	-0.130	-0.113	-0.095	-0.076	-0.057	-0.038	-0.019	-0.000
1.750	-0.153	-0.145	-0.134	-0.121	-0.105	-0.089	-0.072	-0.054	-0.036	-0.018	-0.000
2.000	-0.142	-0.135	-0.125	-0.112	-0.098	-0.083	-0.067	-0.050	-0.033	-0.016	-0.000
2.500	-0.122	-0.116	-0.108	-0.097	-0.085	-0.072	-0.058	-0.044	-0.029	-0.014	-0.000
3.000	-0.105	-0.100	-0.093	-0.084	-0.074	-0.062	-0.050	-0.038	-0.025	-0.012	-0.000
3.500	-0.090	-0.087	-0.081	-0.073	-0.064	-0.054	-0.044	-0.033	-0.022	-0.011	-0.000
4.000	-0.078	-0.075	-0.070	-0.063	-0.055	-0.047	-0.038	-0.029	-0.019	-0.009	-0.000
5.000	-0.057	-0.055	-0.052	-0.047	-0.041	-0.035	-0.028	-0.021	-0.014	-0.007	-0.000
6.000	-0.041	-0.040	-0.038	-0.034	-0.030	-0.026	-0.021	-0.016	-0.011	-0.005	-0.000
7.000	-0.029	-0.029	-0.027	-0.025	-0.022	-0.019	-0.015	-0.012	-0.008	-0.004	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.736	2.480	2.501	3.583

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.893	0.988	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.874	0.981	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.015	0.010	0.856	0.975	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.020	0.010	0.838	0.968	0.992	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.963
0.030	0.010	0.805	0.955	0.986	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.959
0.040	0.010	0.775	0.941	0.980	0.992	0.997	0.998	0.999	1.000	1.000	1.000	0.955
0.050	0.010	0.746	0.927	0.974	0.989	0.995	0.998	0.999	0.999	1.000	1.000	0.952
0.060	0.010	0.720	0.914	0.968	0.986	0.993	0.997	0.998	0.999	0.999	0.999	0.948
0.080	0.010	0.674	0.887	0.955	0.979	0.989	0.994	0.997	0.998	0.999	0.999	0.941
0.100	0.010	0.634	0.862	0.941	0.971	0.985	0.991	0.995	0.997	0.997	0.998	0.935
0.125	0.010	0.591	0.831	0.923	0.961	0.979	0.987	0.992	0.995	0.996	0.996	0.927
0.150	0.010	0.555	0.802	0.905	0.950	0.972	0.983	0.989	0.992	0.993	0.994	0.920
0.175	0.010	0.523	0.775	0.887	0.939	0.965	0.978	0.985	0.989	0.991	0.991	0.912
0.200	0.010	0.496	0.750	0.870	0.928	0.957	0.973	0.981	0.986	0.988	0.988	0.906
0.250	0.010	0.450	0.705	0.836	0.904	0.941	0.961	0.972	0.978	0.981	0.981	0.894
0.300	0.010	0.413	0.665	0.804	0.881	0.924	0.948	0.962	0.969	0.973	0.973	0.882
0.350	0.010	0.383	0.630	0.775	0.858	0.907	0.935	0.951	0.960	0.963	0.964	0.870
0.400	0.010	0.358	0.598	0.747	0.836	0.889	0.921	0.939	0.949	0.953	0.954	0.859
0.500	0.010	0.318	0.546	0.697	0.794	0.855	0.892	0.914	0.926	0.931	0.932	0.839
0.600	0.010	0.288	0.503	0.654	0.755	0.820	0.862	0.887	0.901	0.906	0.908	0.822
0.700	0.010	0.264	0.467	0.615	0.718	0.787	0.832	0.859	0.874	0.880	0.882	0.801
0.800	0.010	0.244	0.436	0.581	0.685	0.756	0.802	0.831	0.847	0.854	0.855	0.784
1.000	0.010	0.213	0.387	0.523	0.624	0.696	0.745	0.775	0.792	0.799	0.801	0.751
1.250	0.010	0.185	0.338	0.463	0.559	0.629	0.677	0.708	0.724	0.732	0.733	0.713
1.500	0.010	0.163	0.300	0.414	0.503	0.569	0.615	0.644	0.660	0.667	0.669	0.678
1.750	0.010	0.146	0.269	0.372	0.453	0.515	0.558	0.585	0.601	0.607	0.609	0.645
2.000	0.010	0.131	0.242	0.335	0.410	0.466	0.506	0.531	0.546	0.552	0.553	0.614
2.500	0.010	0.108	0.197	0.274	0.335	0.382	0.416	0.437	0.450	0.455	0.456	0.554
3.000	0.010	0.089	0.162	0.225	0.276	0.314	0.342	0.360	0.370	0.375	0.376	0.505
3.500	0.010	0.074	0.134	0.185	0.227	0.259	0.282	0.297	0.305	0.309	0.310	0.459
4.000	0.010	0.062	0.111	0.153	0.187	0.214	0.232	0.245	0.252	0.255	0.256	0.412
5.000	0.010	0.045	0.077	0.105	0.128	0.146	0.158	0.167	0.172	0.174	0.175	0.346
6.000	0.010	0.033	0.054	0.073	0.088	0.100	0.109	0.115	0.118	0.120	0.120	0.289
7.000	0.010	0.025	0.039	0.051	0.062	0.070	0.075	0.079	0.082	0.083	0.083	0.242

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.005	-0.485	-0.170	-0.051	-0.014	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.472	-0.176	-0.058	-0.020	-0.007	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000
0.015	-0.459	-0.181	-0.064	-0.024	-0.010	-0.004	-0.001	-0.000	-0.000	-0.000	-0.000
0.020	-0.448	-0.185	-0.070	-0.029	-0.012	-0.005	-0.002	-0.001	-0.000	-0.000	-0.000
0.030	-0.427	-0.192	-0.080	-0.036	-0.017	-0.009	-0.004	-0.002	-0.001	-0.000	-0.000
0.040	-0.409	-0.197	-0.088	-0.042	-0.021	-0.011	-0.006	-0.003	-0.002	-0.001	-0.000
0.050	-0.394	-0.201	-0.095	-0.047	-0.025	-0.014	-0.008	-0.005	-0.002	-0.001	-0.000
0.060	-0.380	-0.204	-0.101	-0.052	-0.029	-0.017	-0.010	-0.006	-0.003	-0.001	-0.000
0.080	-0.356	-0.207	-0.110	-0.061	-0.036	-0.022	-0.013	-0.008	-0.005	-0.002	-0.000
0.100	-0.337	-0.208	-0.118	-0.068	-0.041	-0.026	-0.017	-0.011	-0.006	-0.003	-0.000
0.125	-0.317	-0.208	-0.125	-0.076	-0.048	-0.031	-0.020	-0.013	-0.008	-0.004	-0.000
0.150	-0.301	-0.207	-0.131	-0.082	-0.053	-0.035	-0.024	-0.016	-0.010	-0.005	-0.000
0.175	-0.287	-0.206	-0.135	-0.088	-0.058	-0.039	-0.027	-0.018	-0.011	-0.005	-0.000
0.200	-0.276	-0.203	-0.138	-0.092	-0.063	-0.043	-0.030	-0.020	-0.013	-0.006	-0.000
0.250	-0.257	-0.199	-0.142	-0.099	-0.070	-0.050	-0.035	-0.024	-0.015	-0.007	-0.000
0.300	-0.242	-0.194	-0.144	-0.105	-0.076	-0.055	-0.040	-0.028	-0.018	-0.009	-0.000
0.350	-0.230	-0.189	-0.145	-0.108	-0.080	-0.059	-0.043	-0.031	-0.020	-0.009	-0.000
0.400	-0.220	-0.185	-0.146	-0.111	-0.084	-0.063	-0.047	-0.033	-0.021	-0.010	-0.000
0.500	-0.204	-0.177	-0.145	-0.115	-0.089	-0.069	-0.052	-0.037	-0.024	-0.012	-0.000
0.600	-0.191	-0.169	-0.143	-0.116	-0.093	-0.073	-0.055	-0.040	-0.026	-0.013	-0.000
0.700	-0.182	-0.163	-0.140	-0.116	-0.095	-0.075	-0.058	-0.042	-0.028	-0.013	-0.000
0.800	-0.173	-0.158	-0.137	-0.116	-0.096	-0.077	-0.060	-0.044	-0.029	-0.014	-0.000
1.000	-0.160	-0.148	-0.132	-0.114	-0.096	-0.078	-0.061	-0.045	-0.030	-0.015	-0.000
1.250	-0.148	-0.138	-0.125	-0.110	-0.094	-0.078	-0.062	-0.046	-0.030	-0.015	-0.000
1.500	-0.138	-0.129	-0.118	-0.105	-0.090	-0.075	-0.060	-0.045	-0.030	-0.014	-0.000
1.750	-0.129	-0.122	-0.112	-0.100	-0.087	-0.073	-0.058	-0.044	-0.029	-0.014	-0.000
2.000	-0.122	-0.115	-0.106	-0.095	-0.083	-0.070	-0.056	-0.042	-0.028	-0.014	-0.000
2.500	-0.109	-0.103	-0.096	-0.086	-0.075	-0.063	-0.051	-0.038	-0.025	-0.012	-0.000
3.000	-0.097	-0.093	-0.086	-0.078	-0.068	-0.057	-0.046	-0.035	-0.023	-0.011	-0.000
3.500	-0.088	-0.084	-0.078	-0.070	-0.061	-0.052	-0.042	-0.031	-0.021	-0.010	-0.000
4.000	-0.079	-0.075	-0.070	-0.063	-0.055	-0.047	-0.038	-0.028	-0.019	-0.009	-0.000
5.000	-0.063	-0.061	-0.057	-0.051	-0.045	-0.038	-0.031	-0.023	-0.015	-0.008	-0.000
6.000	-0.051	-0.049	-0.046	-0.041	-0.036	-0.031	-0.025	-0.019	-0.012	-0.006	-0.000
7.000	-0.041	-0.039	-0.037	-0.033	-0.029	-0.025	-0.020	-0.015	-0.010	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.813	2.604	2.631	3.499

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.894	0.988	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.010	0.010	0.878	0.983	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.015	0.010	0.863	0.977	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.966
0.020	0.010	0.849	0.972	0.993	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.964
0.030	0.010	0.821	0.961	0.989	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.961
0.040	0.010	0.794	0.950	0.984	0.994	0.997	0.999	0.999	1.000	1.000	1.000	0.958
0.050	0.010	0.770	0.939	0.979	0.992	0.996	0.998	0.999	1.000	1.000	1.000	0.955
0.060	0.010	0.747	0.928	0.974	0.989	0.995	0.997	0.999	0.999	1.000	1.000	0.952
0.080	0.010	0.706	0.906	0.964	0.984	0.992	0.996	0.998	0.999	0.999	0.999	0.946
0.100	0.010	0.669	0.884	0.953	0.978	0.989	0.994	0.996	0.998	0.998	0.998	0.940
0.125	0.010	0.629	0.858	0.939	0.970	0.984	0.991	0.994	0.996	0.997	0.997	0.934
0.150	0.010	0.594	0.833	0.924	0.962	0.979	0.987	0.992	0.994	0.995	0.996	0.928
0.175	0.010	0.564	0.809	0.909	0.953	0.973	0.984	0.989	0.992	0.993	0.994	0.922
0.200	0.010	0.537	0.787	0.895	0.944	0.967	0.980	0.986	0.990	0.991	0.992	0.916
0.250	0.010	0.491	0.745	0.866	0.925	0.955	0.971	0.980	0.984	0.986	0.987	0.905
0.300	0.010	0.454	0.708	0.839	0.906	0.942	0.961	0.972	0.978	0.980	0.981	0.894
0.350	0.010	0.423	0.675	0.813	0.887	0.928	0.951	0.964	0.970	0.973	0.974	0.884
0.400	0.010	0.397	0.645	0.788	0.868	0.914	0.940	0.955	0.962	0.966	0.967	0.875
0.500	0.010	0.354	0.593	0.742	0.832	0.885	0.917	0.935	0.945	0.949	0.950	0.857
0.600	0.010	0.322	0.550	0.701	0.797	0.857	0.893	0.914	0.925	0.930	0.931	0.840
0.700	0.010	0.296	0.514	0.665	0.764	0.828	0.868	0.892	0.905	0.910	0.911	0.824
0.800	0.010	0.275	0.483	0.632	0.734	0.801	0.844	0.869	0.883	0.889	0.890	0.809
1.000	0.010	0.241	0.431	0.575	0.678	0.749	0.795	0.823	0.838	0.845	0.846	0.780
1.250	0.010	0.211	0.382	0.516	0.617	0.688	0.736	0.765	0.781	0.788	0.790	0.746
1.500	0.010	0.188	0.342	0.468	0.563	0.633	0.680	0.710	0.726	0.733	0.734	0.715
1.750	0.010	0.169	0.310	0.426	0.516	0.582	0.628	0.657	0.672	0.679	0.680	0.686
2.000	0.010	0.154	0.282	0.389	0.473	0.536	0.579	0.607	0.622	0.628	0.629	0.658
2.500	0.010	0.129	0.237	0.328	0.400	0.455	0.493	0.517	0.531	0.536	0.538	0.606
3.000	0.010	0.110	0.200	0.278	0.339	0.386	0.419	0.440	0.452	0.457	0.458	0.559
3.500	0.010	0.094	0.170	0.236	0.288	0.328	0.357	0.375	0.385	0.389	0.390	0.516
4.000	0.010	0.081	0.145	0.201	0.245	0.280	0.304	0.319	0.328	0.332	0.333	0.477
5.000	0.010	0.060	0.106	0.146	0.178	0.203	0.220	0.232	0.239	0.241	0.242	0.407
6.000	0.010	0.046	0.078	0.107	0.130	0.148	0.160	0.169	0.173	0.176	0.176	0.349
7.000	0.010	0.035	0.059	0.079	0.095	0.108	0.117	0.123	0.127	0.129	0.129	0.300

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.005	-0.397	-0.140	-0.042	-0.012	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.388	-0.144	-0.047	-0.016	-0.005	-0.002	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.379	-0.147	-0.052	-0.019	-0.008	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000
0.020	-0.371	-0.151	-0.056	-0.022	-0.010	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.030	-0.357	-0.156	-0.063	-0.027	-0.013	-0.006	-0.003	-0.002	-0.001	-0.000	-0.000
0.040	-0.344	-0.160	-0.069	-0.032	-0.016	-0.009	-0.005	-0.002	-0.001	-0.001	-0.000
0.050	-0.332	-0.163	-0.074	-0.036	-0.019	-0.011	-0.006	-0.003	-0.002	-0.001	-0.000
0.060	-0.322	-0.165	-0.078	-0.040	-0.022	-0.012	-0.007	-0.004	-0.002	-0.001	-0.000
0.080	-0.304	-0.169	-0.086	-0.046	-0.026	-0.016	-0.010	-0.006	-0.004	-0.002	-0.000
0.100	-0.289	-0.170	-0.092	-0.052	-0.031	-0.019	-0.012	-0.008	-0.005	-0.002	-0.000
0.125	-0.273	-0.171	-0.098	-0.058	-0.035	-0.023	-0.015	-0.010	-0.006	-0.003	-0.000
0.150	-0.260	-0.171	-0.103	-0.063	-0.040	-0.026	-0.017	-0.011	-0.007	-0.003	-0.000
0.175	-0.249	-0.171	-0.107	-0.067	-0.044	-0.029	-0.020	-0.013	-0.008	-0.004	-0.000
0.200	-0.240	-0.170	-0.110	-0.071	-0.047	-0.032	-0.022	-0.015	-0.009	-0.004	-0.000
0.250	-0.224	-0.167	-0.114	-0.077	-0.053	-0.037	-0.026	-0.018	-0.011	-0.005	-0.000
0.300	-0.211	-0.164	-0.117	-0.082	-0.058	-0.041	-0.029	-0.020	-0.013	-0.006	-0.000
0.350	-0.201	-0.160	-0.119	-0.086	-0.062	-0.045	-0.032	-0.023	-0.014	-0.007	-0.000
0.400	-0.192	-0.157	-0.120	-0.088	-0.065	-0.048	-0.035	-0.025	-0.016	-0.008	-0.000
0.500	-0.179	-0.151	-0.120	-0.092	-0.070	-0.053	-0.039	-0.028	-0.018	-0.009	-0.000
0.600	-0.168	-0.146	-0.119	-0.094	-0.074	-0.057	-0.043	-0.031	-0.020	-0.010	-0.000
0.700	-0.160	-0.141	-0.118	-0.096	-0.076	-0.059	-0.045	-0.033	-0.021	-0.010	-0.000
0.800	-0.152	-0.136	-0.116	-0.096	-0.077	-0.061	-0.047	-0.034	-0.022	-0.011	-0.000
1.000	-0.141	-0.129	-0.113	-0.095	-0.079	-0.064	-0.050	-0.036	-0.024	-0.012	-0.000
1.250	-0.130	-0.121	-0.108	-0.093	-0.079	-0.065	-0.051	-0.038	-0.025	-0.012	-0.000
1.500	-0.122	-0.114	-0.103	-0.091	-0.077	-0.064	-0.051	-0.038	-0.025	-0.012	-0.000
1.750	-0.115	-0.108	-0.099	-0.087	-0.075	-0.063	-0.050	-0.037	-0.025	-0.012	-0.000
2.000	-0.109	-0.103	-0.095	-0.084	-0.073	-0.061	-0.049	-0.036	-0.024	-0.012	-0.000
2.500	-0.099	-0.094	-0.087	-0.078	-0.068	-0.057	-0.046	-0.034	-0.023	-0.011	-0.000
3.000	-0.090	-0.086	-0.080	-0.072	-0.062	-0.053	-0.042	-0.032	-0.021	-0.010	-0.000
3.500	-0.083	-0.079	-0.073	-0.066	-0.057	-0.048	-0.039	-0.029	-0.019	-0.009	-0.000
4.000	-0.076	-0.072	-0.067	-0.060	-0.053	-0.045	-0.036	-0.027	-0.018	-0.009	-0.000
5.000	-0.063	-0.061	-0.056	-0.051	-0.045	-0.038	-0.030	-0.023	-0.015	-0.007	-0.000
6.000	-0.053	-0.051	-0.047	-0.043	-0.037	-0.032	-0.026	-0.019	-0.013	-0.006	-0.000
7.000	-0.044	-0.043	-0.040	-0.036	-0.032	-0.027	-0.022	-0.016	-0.011	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.846	2.658	2.666	3.411

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.895	0.988	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.010	0.010	0.881	0.983	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.963
0.015	0.010	0.868	0.979	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.020	0.010	0.855	0.974	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.030	0.010	0.830	0.965	0.990	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.962
0.040	0.010	0.807	0.955	0.986	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.959
0.050	0.010	0.785	0.946	0.982	0.993	0.997	0.999	0.999	1.000	1.000	1.000	0.957
0.060	0.010	0.764	0.936	0.978	0.991	0.996	0.998	0.999	0.999	1.000	1.000	0.954
0.080	0.010	0.726	0.917	0.969	0.987	0.993	0.997	0.998	0.999	0.999	0.999	0.949
0.100	0.010	0.692	0.898	0.960	0.982	0.991	0.995	0.997	0.998	0.999	0.999	0.944
0.125	0.010	0.654	0.875	0.948	0.975	0.987	0.992	0.995	0.997	0.998	0.998	0.938
0.150	0.010	0.621	0.852	0.935	0.968	0.983	0.990	0.993	0.995	0.996	0.996	0.932
0.175	0.010	0.592	0.831	0.923	0.961	0.978	0.987	0.991	0.994	0.995	0.995	0.927
0.200	0.010	0.565	0.810	0.910	0.953	0.973	0.984	0.989	0.992	0.993	0.993	0.922
0.250	0.010	0.520	0.772	0.885	0.937	0.963	0.976	0.984	0.987	0.989	0.989	0.912
0.300	0.010	0.483	0.737	0.860	0.921	0.952	0.969	0.978	0.982	0.984	0.985	0.902
0.350	0.010	0.451	0.706	0.837	0.904	0.940	0.960	0.971	0.976	0.979	0.979	0.892
0.400	0.010	0.425	0.677	0.814	0.888	0.928	0.951	0.964	0.970	0.973	0.973	0.885
0.500	0.010	0.381	0.626	0.772	0.855	0.904	0.932	0.947	0.956	0.959	0.960	0.869
0.600	0.010	0.347	0.584	0.733	0.824	0.879	0.911	0.930	0.940	0.944	0.945	0.853
0.700	0.010	0.320	0.548	0.698	0.794	0.854	0.890	0.911	0.923	0.927	0.928	0.839
0.800	0.010	0.298	0.516	0.667	0.766	0.829	0.869	0.892	0.904	0.909	0.910	0.825
1.000	0.010	0.262	0.464	0.611	0.714	0.782	0.826	0.852	0.865	0.872	0.873	0.792
1.250	0.010	0.230	0.413	0.554	0.656	0.727	0.773	0.802	0.817	0.823	0.824	0.768
1.500	0.010	0.206	0.373	0.506	0.605	0.675	0.722	0.752	0.767	0.774	0.775	0.739
1.750	0.010	0.187	0.340	0.464	0.559	0.628	0.674	0.703	0.719	0.726	0.727	0.712
2.000	0.010	0.171	0.312	0.428	0.518	0.584	0.629	0.657	0.673	0.679	0.680	0.687
2.500	0.010	0.145	0.266	0.367	0.446	0.505	0.546	0.572	0.587	0.592	0.594	0.639
3.000	0.010	0.125	0.229	0.316	0.386	0.438	0.474	0.498	0.510	0.516	0.517	0.595
3.500	0.010	0.108	0.198	0.274	0.334	0.380	0.412	0.432	0.444	0.448	0.449	0.554
4.000	0.010	0.095	0.172	0.237	0.290	0.330	0.358	0.376	0.386	0.390	0.391	0.517
5.000	0.010	0.073	0.130	0.179	0.219	0.249	0.270	0.284	0.291	0.294	0.295	0.452
6.000	0.010	0.057	0.099	0.136	0.166	0.188	0.204	0.215	0.220	0.223	0.223	0.392
7.000	0.010	0.044	0.076	0.104	0.126	0.143	0.155	0.163	0.167	0.169	0.169	0.343

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.005	-0.344	-0.122	-0.037	-0.010	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.337	-0.125	-0.041	-0.014	-0.005	-0.002	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.331	-0.127	-0.044	-0.016	-0.006	-0.003	-0.001	-0.000	-0.000	-0.000	-0.000
0.020	-0.325	-0.130	-0.047	-0.019	-0.008	-0.003	-0.002	-0.001	-0.000	-0.000	-0.000
0.030	-0.313	-0.134	-0.053	-0.023	-0.011	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.040	-0.303	-0.137	-0.058	-0.026	-0.013	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000
0.050	-0.294	-0.140	-0.062	-0.030	-0.015	-0.009	-0.005	-0.003	-0.001	-0.001	-0.000
0.060	-0.286	-0.142	-0.065	-0.033	-0.018	-0.010	-0.006	-0.003	-0.002	-0.001	-0.000
0.080	-0.271	-0.145	-0.072	-0.038	-0.021	-0.013	-0.008	-0.005	-0.003	-0.001	-0.000
0.100	-0.259	-0.147	-0.077	-0.042	-0.025	-0.015	-0.010	-0.006	-0.004	-0.002	-0.000
0.125	-0.246	-0.149	-0.082	-0.047	-0.029	-0.018	-0.012	-0.008	-0.005	-0.002	-0.000
0.150	-0.234	-0.149	-0.087	-0.052	-0.032	-0.021	-0.014	-0.009	-0.006	-0.003	-0.000
0.175	-0.225	-0.149	-0.090	-0.055	-0.035	-0.023	-0.016	-0.010	-0.006	-0.003	-0.000
0.200	-0.217	-0.148	-0.093	-0.059	-0.038	-0.026	-0.017	-0.012	-0.007	-0.004	-0.000
0.250	-0.203	-0.147	-0.097	-0.064	-0.043	-0.030	-0.021	-0.014	-0.009	-0.004	-0.000
0.300	-0.192	-0.145	-0.100	-0.068	-0.047	-0.033	-0.023	-0.016	-0.010	-0.005	-0.000
0.350	-0.183	-0.142	-0.102	-0.072	-0.051	-0.036	-0.026	-0.018	-0.011	-0.006	-0.000
0.400	-0.175	-0.140	-0.103	-0.074	-0.054	-0.039	-0.028	-0.020	-0.013	-0.006	-0.000
0.500	-0.163	-0.135	-0.104	-0.078	-0.058	-0.044	-0.032	-0.023	-0.015	-0.007	-0.000
0.600	-0.153	-0.131	-0.104	-0.081	-0.062	-0.047	-0.035	-0.025	-0.016	-0.008	-0.000
0.700	-0.145	-0.126	-0.104	-0.082	-0.064	-0.050	-0.037	-0.027	-0.017	-0.008	-0.000
0.800	-0.139	-0.123	-0.103	-0.083	-0.066	-0.052	-0.039	-0.029	-0.019	-0.009	-0.000
1.000	-0.129	-0.116	-0.100	-0.084	-0.068	-0.054	-0.042	-0.031	-0.020	-0.010	-0.000
1.250	-0.119	-0.110	-0.097	-0.083	-0.069	-0.056	-0.044	-0.032	-0.021	-0.010	-0.000
1.500	-0.112	-0.104	-0.093	-0.081	-0.068	-0.056	-0.044	-0.033	-0.022	-0.010	-0.000
1.750	-0.106	-0.099	-0.090	-0.079	-0.067	-0.056	-0.044	-0.033	-0.022	-0.010	-0.000
2.000	-0.100	-0.095	-0.086	-0.076	-0.066	-0.055	-0.044	-0.032	-0.021	-0.010	-0.000
2.500	-0.092	-0.087	-0.080	-0.071	-0.062	-0.052	-0.042	-0.031	-0.021	-0.010	-0.000
3.000	-0.084	-0.080	-0.074	-0.067	-0.058	-0.049	-0.039	-0.029	-0.019	-0.009	-0.000
3.500	-0.078	-0.074	-0.069	-0.062	-0.054	-0.045	-0.037	-0.027	-0.018	-0.009	-0.000
4.000	-0.072	-0.069	-0.064	-0.057	-0.050	-0.042	-0.034	-0.026	-0.017	-0.008	-0.000
5.000	-0.062	-0.059	-0.055	-0.050	-0.043	-0.037	-0.029	-0.022	-0.015	-0.007	-0.000
6.000	-0.053	-0.051	-0.047	-0.043	-0.037	-0.032	-0.025	-0.019	-0.013	-0.006	-0.000
7.000	-0.045	-0.044	-0.041	-0.037	-0.032	-0.027	-0.022	-0.016	-0.011	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.866	2.692	2.681	3.343

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.895	0.988	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.010	0.010	0.883	0.984	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.015	0.010	0.871	0.980	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.020	0.010	0.859	0.976	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.966
0.030	0.010	0.837	0.967	0.991	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.963
0.040	0.010	0.816	0.959	0.988	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.960
0.050	0.010	0.795	0.950	0.984	0.994	0.997	0.999	0.999	1.000	1.000	1.000	0.958
0.060	0.010	0.776	0.942	0.981	0.992	0.996	0.998	0.999	0.999	1.000	1.000	0.954
0.080	0.010	0.741	0.925	0.973	0.988	0.994	0.997	0.998	0.999	0.999	0.999	0.951
0.100	0.010	0.709	0.907	0.965	0.984	0.992	0.996	0.997	0.998	0.999	0.999	0.944
0.125	0.010	0.673	0.887	0.954	0.978	0.989	0.994	0.996	0.997	0.998	0.998	0.941
0.150	0.010	0.641	0.866	0.943	0.972	0.985	0.991	0.995	0.996	0.997	0.997	0.936
0.175	0.010	0.613	0.846	0.932	0.966	0.981	0.989	0.993	0.995	0.996	0.996	0.931
0.200	0.010	0.587	0.827	0.920	0.959	0.977	0.986	0.991	0.993	0.994	0.994	0.926
0.250	0.010	0.543	0.792	0.898	0.945	0.968	0.980	0.986	0.989	0.991	0.991	0.917
0.300	0.010	0.505	0.759	0.875	0.931	0.959	0.973	0.981	0.985	0.987	0.987	0.908
0.350	0.010	0.474	0.728	0.854	0.916	0.949	0.966	0.975	0.980	0.982	0.983	0.900
0.400	0.010	0.447	0.701	0.833	0.901	0.938	0.958	0.969	0.975	0.977	0.978	0.892
0.500	0.010	0.403	0.652	0.793	0.872	0.916	0.941	0.955	0.963	0.966	0.966	0.877
0.600	0.010	0.368	0.610	0.757	0.843	0.894	0.924	0.940	0.949	0.953	0.953	0.862
0.700	0.010	0.340	0.574	0.724	0.816	0.872	0.905	0.924	0.934	0.938	0.939	0.849
0.800	0.010	0.317	0.542	0.693	0.789	0.849	0.886	0.907	0.919	0.923	0.924	0.836
1.000	0.010	0.280	0.490	0.639	0.740	0.806	0.848	0.872	0.885	0.890	0.891	0.812
1.250	0.010	0.246	0.439	0.583	0.685	0.754	0.800	0.827	0.841	0.847	0.848	0.782
1.500	0.010	0.221	0.398	0.535	0.636	0.706	0.753	0.782	0.797	0.803	0.804	0.756
1.750	0.010	0.201	0.364	0.494	0.591	0.661	0.708	0.737	0.752	0.759	0.760	0.731
2.000	0.010	0.184	0.335	0.458	0.551	0.619	0.665	0.694	0.709	0.716	0.717	0.707
2.500	0.010	0.157	0.288	0.397	0.481	0.544	0.587	0.614	0.628	0.634	0.635	0.662
3.000	0.010	0.137	0.251	0.346	0.422	0.478	0.517	0.542	0.555	0.560	0.561	0.621
3.500	0.010	0.120	0.220	0.304	0.370	0.420	0.455	0.477	0.489	0.494	0.495	0.583
4.000	0.010	0.106	0.193	0.267	0.326	0.370	0.401	0.421	0.431	0.436	0.437	0.547
5.000	0.010	0.083	0.150	0.207	0.252	0.287	0.311	0.326	0.335	0.338	0.339	0.482
6.000	0.010	0.066	0.117	0.161	0.196	0.223	0.242	0.254	0.260	0.263	0.264	0.424
7.000	0.010	0.053	0.092	0.126	0.153	0.173	0.188	0.197	0.203	0.205	0.205	0.377

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.005	-0.308	-0.109	-0.034	-0.010	-0.002	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
0.010	-0.302	-0.112	-0.037	-0.012	-0.004	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
0.015	-0.297	-0.114	-0.039	-0.014	-0.006	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000
0.020	-0.292	-0.116	-0.042	-0.016	-0.007	-0.003	-0.001	-0.001	-0.000	-0.000	-0.000
0.030	-0.283	-0.119	-0.046	-0.020	-0.009	-0.005	-0.002	-0.001	-0.001	-0.000	-0.000
0.040	-0.275	-0.122	-0.050	-0.023	-0.011	-0.006	-0.003	-0.002	-0.001	-0.000	-0.000
0.050	-0.267	-0.125	-0.054	-0.025	-0.013	-0.007	-0.004	-0.002	-0.001	-0.001	-0.000
0.060	-0.260	-0.127	-0.057	-0.028	-0.015	-0.008	-0.005	-0.003	-0.002	-0.001	-0.000
0.080	-0.248	-0.129	-0.062	-0.032	-0.018	-0.011	-0.007	-0.004	-0.002	-0.001	-0.000
0.100	-0.237	-0.131	-0.067	-0.036	-0.021	-0.013	-0.008	-0.005	-0.003	-0.001	-0.000
0.125	-0.226	-0.133	-0.072	-0.040	-0.024	-0.015	-0.010	-0.006	-0.004	-0.002	-0.000
0.150	-0.216	-0.133	-0.076	-0.044	-0.027	-0.018	-0.012	-0.008	-0.005	-0.002	-0.000
0.175	-0.207	-0.134	-0.079	-0.047	-0.030	-0.020	-0.013	-0.009	-0.005	-0.003	-0.000
0.200	-0.200	-0.133	-0.081	-0.050	-0.032	-0.022	-0.015	-0.010	-0.006	-0.003	-0.000
0.250	-0.188	-0.132	-0.086	-0.055	-0.037	-0.025	-0.017	-0.012	-0.007	-0.004	-0.000
0.300	-0.178	-0.131	-0.088	-0.059	-0.040	-0.028	-0.020	-0.014	-0.009	-0.004	-0.000
0.350	-0.169	-0.129	-0.090	-0.062	-0.044	-0.031	-0.022	-0.015	-0.010	-0.005	-0.000
0.400	-0.162	-0.127	-0.092	-0.065	-0.046	-0.033	-0.024	-0.017	-0.011	-0.005	-0.000
0.500	-0.151	-0.123	-0.093	-0.069	-0.051	-0.037	-0.027	-0.019	-0.012	-0.006	-0.000
0.600	-0.142	-0.120	-0.094	-0.071	-0.054	-0.040	-0.030	-0.021	-0.014	-0.007	-0.000
0.700	-0.135	-0.116	-0.094	-0.073	-0.056	-0.043	-0.032	-0.023	-0.015	-0.007	-0.000
0.800	-0.129	-0.113	-0.093	-0.074	-0.058	-0.045	-0.034	-0.025	-0.016	-0.008	-0.000
1.000	-0.120	-0.107	-0.091	-0.075	-0.061	-0.048	-0.037	-0.027	-0.017	-0.009	-0.000
1.250	-0.111	-0.101	-0.088	-0.075	-0.062	-0.050	-0.039	-0.028	-0.019	-0.009	-0.000
1.500	-0.104	-0.096	-0.086	-0.074	-0.062	-0.050	-0.040	-0.029	-0.019	-0.009	-0.000
1.750	-0.099	-0.092	-0.083	-0.072	-0.061	-0.050	-0.040	-0.030	-0.019	-0.009	-0.000
2.000	-0.094	-0.088	-0.080	-0.070	-0.060	-0.050	-0.040	-0.029	-0.019	-0.009	-0.000
2.500	-0.086	-0.081	-0.075	-0.066	-0.057	-0.048	-0.038	-0.029	-0.019	-0.009	-0.000
3.000	-0.080	-0.076	-0.070	-0.062	-0.054	-0.046	-0.036	-0.027	-0.018	-0.009	-0.000
3.500	-0.074	-0.071	-0.065	-0.059	-0.051	-0.043	-0.034	-0.026	-0.017	-0.008	-0.000
4.000	-0.069	-0.066	-0.061	-0.055	-0.048	-0.040	-0.032	-0.024	-0.016	-0.008	-0.000
5.000	-0.060	-0.057	-0.053	-0.048	-0.042	-0.035	-0.029	-0.021	-0.014	-0.007	-0.000
6.000	-0.052	-0.050	-0.047	-0.042	-0.037	-0.031	-0.025	-0.019	-0.012	-0.006	-0.000
7.000	-0.046	-0.044	-0.041	-0.037	-0.032	-0.027	-0.022	-0.016	-0.011	-0.005	-0.000

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.879	2.716	2.690	3.288

CASE IV - CONSTANT PRESSURE AT THE PRODUCING FACE AND A CONSTANT PRESSURE AT THE EXTERNAL BOUNDARY

$\overline{P}_w = 0.10$

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 0.0

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.864	0.980	0.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000	[illegible]
0.010	0.010	0.639	0.914	0.982	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.941
0.015	0.010	0.516	0.825	0.950	0.988	0.997	0.999	1.000	1.000	1.000	1.000	0.925
0.020	0.010	0.456	0.751	0.907	0.971	0.992	0.998	1.000	1.000	1.000	1.000	0.912
0.030	0.010	0.374	0.650	0.827	0.926	0.972	0.990	0.997	0.999	1.000	1.000	[illegible]
0.040	0.010	0.328	0.582	0.763	0.878	0.943	0.976	0.991	0.997	0.999	1.000	0.872
0.050	0.010	0.295	0.532	0.710	0.834	0.912	0.957	0.980	0.992	0.997	1.000	0.857
0.060	0.010	0.271	0.493	0.668	0.795	0.881	0.935	0.967	0.985	0.994	1.000	[illegible]
0.080	0.010	0.237	0.436	0.601	0.730	0.825	0.893	0.939	0.967	0.986	1.000	0.818
0.100	0.010	0.213	0.396	0.552	0.679	0.778	0.853	0.908	0.947	0.976	1.000	0.798
0.125	0.010	0.192	0.359	0.505	0.628	0.729	0.810	0.874	0.923	0.964	1.000	0.777
0.150	0.010	0.177	0.331	0.469	0.589	0.690	0.775	0.844	0.903	0.953	1.000	[illegible]
0.175	0.010	0.165	0.310	0.441	0.557	0.658	0.745	0.820	0.885	0.945	1.000	0.746
0.200	0.010	0.155	0.292	0.418	0.532	0.632	0.721	0.801	0.872	0.937	1.000	0.734
0.250	0.010	0.141	0.267	0.385	0.493	0.594	0.686	0.771	0.850	0.926	1.000	0.716
0.300	0.010	0.132	0.250	0.362	0.457	0.567	0.661	0.750	0.836	0.918	1.000	0.704
0.350	0.010	0.125	0.238	0.346	0.450	0.549	0.644	0.736	0.825	0.913	1.000	0.695
0.400	0.010	0.121	0.229	0.335	0.437	0.536	0.633	0.727	0.819	0.910	1.000	[illegible]
0.500	0.010	0.115	0.219	0.321	0.422	0.521	0.618	0.715	0.810	0.905	1.000	0.681
0.600	0.010	0.112	0.213	0.314	0.414	0.513	0.611	0.709	0.805	0.903	1.000	0.677
0.700	0.010	0.111	0.211	0.311	0.410	0.509	0.608	0.706	0.804	0.902	1.000	0.675
0.800	0.010	0.110	0.209	0.309	0.408	0.507	0.606	0.705	0.803	0.902	1.000	0.674
1.000	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
1.250	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
1.500	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
1.750	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
2.000	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
2.500	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
3.000	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
3.500	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
4.000	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
5.000	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
6.000	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673
7.000	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 0.0

FLOWRATE DISTRIBUTION

0.005	-8.811	-1.403	-0.201	-0.029	-0.004	-0.001	-0.000	0.0	0.0	0.0	0.0
0.010	-3.399	-2.341	-0.669	-0.148	-0.029	-0.005	-0.001	-0.000	0.0	0.0	0.0
0.015	-3.085	-2.051	-1.011	-0.339	-0.091	-0.021	-0.005	-0.001	-0.000	0.0	0.0
0.020	-2.504	-1.868	-1.101	-0.503	-0.180	-0.054	-0.014	-0.003	-0.001	-0.000	0.0
0.030	-2.004	-1.626	-1.120	-0.669	-0.338	-0.145	-0.054	-0.018	-0.006	-0.002	-0.001
0.040	-1.699	-1.444	-1.087	-0.727	-0.436	-0.233	-0.110	-0.046	-0.018	-0.007	-0.004
0.050	-1.515	-1.322	-1.037	-0.748	-0.493	-0.298	-0.164	-0.082	-0.033	-0.018	-0.013
0.060	-1.373	-1.220	-0.993	-0.749	-0.527	-0.344	-0.209	-0.118	-0.063	-0.034	-0.026
0.080	-1.181	-1.076	-0.913	-0.733	-0.557	-0.402	-0.276	-0.180	-0.115	-0.078	-0.066
0.100	-1.051	-0.972	-0.849	-0.706	-0.564	-0.433	-0.320	-0.231	-0.167	-0.128	-0.115
0.125	-0.938	-0.879	-0.784	-0.673	-0.560	-0.453	-0.358	-0.280	-0.222	-0.188	-0.176
0.150	-0.854	-0.808	-0.733	-0.644	-0.552	-0.463	-0.384	-0.318	-0.262	-0.233	-0.229
0.175	-0.791	-0.754	-0.692	-0.619	-0.543	-0.469	-0.403	-0.349	-0.308	-0.283	-0.275
0.200	-0.740	-0.709	-0.659	-0.598	-0.535	-0.474	-0.419	-0.373	-0.339	-0.319	-0.312
0.250	-0.666	-0.645	-0.609	-0.567	-0.522	-0.480	-0.442	-0.410	-0.387	-0.373	-0.368
0.300	-0.616	-0.600	-0.575	-0.545	-0.514	-0.484	-0.457	-0.435	-0.419	-0.410	-0.405
0.350	-0.581	-0.570	-0.552	-0.530	-0.508	-0.487	-0.468	-0.453	-0.442	-0.435	-0.433
0.400	-0.556	-0.548	-0.535	-0.520	-0.504	-0.489	-0.476	-0.465	-0.457	-0.452	-0.451
0.500	-0.526	-0.522	-0.515	-0.507	-0.499	-0.492	-0.485	-0.480	-0.476	-0.474	-0.473
0.600	-0.511	-0.509	-0.505	-0.501	-0.497	-0.493	-0.490	-0.487	-0.485	-0.484	-0.484
0.700	-0.503	-0.502	-0.500	-0.498	-0.496	-0.494	-0.492	-0.491	-0.490	-0.489	-0.489
0.800	-0.499	-0.498	-0.498	-0.497	-0.496	-0.495	-0.494	-0.493	-0.492	-0.492	-0.492
1.000	-0.496	-0.496	-0.496	-0.495	-0.495	-0.495	-0.495	-0.495	-0.494	-0.494	-0.494
1.250	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495
1.500	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495
1.750	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495
2.000	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495
2.500	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495
3.000	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495
3.500	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495
4.000	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495
5.000	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495
6.000	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495
7.000	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495	-0.495

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	0.425	0.263	0.203	0.176

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.922	0.993	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.973
0.010	0.010	0.894	0.985	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.015	0.010	0.867	0.976	0.994	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.020	0.010	0.842	0.968	0.991	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.964
0.030	0.010	0.795	0.949	0.984	0.994	0.998	0.999	1.000	1.000	1.000	1.000	0.959
0.040	0.010	0.754	0.931	0.976	0.991	0.996	0.998	0.999	1.000	1.000	1.000	0.953
0.050	0.010	0.718	0.912	0.968	0.987	0.994	0.997	0.999	1.000	1.000	1.000	0.948
0.060	0.010	0.685	0.894	0.958	0.982	0.992	0.996	0.998	0.999	1.000	1.000	0.943
0.080	0.010	0.628	0.858	0.939	0.971	0.986	0.993	0.996	0.998	0.999	1.000	0.934
0.100	0.010	0.582	0.824	0.920	0.960	0.979	0.988	0.994	0.997	0.999	1.000	0.926
0.125	0.010	0.534	0.785	0.895	0.945	0.970	0.983	0.990	0.995	0.998	1.000	0.917
0.150	0.010	0.495	0.750	0.870	0.929	0.960	0.976	0.986	0.992	0.996	1.000	0.908
0.175	0.010	0.463	0.717	0.847	0.913	0.949	0.969	0.981	0.989	0.995	1.000	0.900
0.200	0.010	0.435	0.688	0.824	0.898	0.938	0.962	0.977	0.986	0.994	1.000	0.892
0.250	0.010	0.390	0.637	0.782	0.866	0.916	0.947	0.966	0.980	0.991	1.000	0.877
0.300	0.010	0.355	0.594	0.745	0.837	0.894	0.931	0.956	0.973	0.988	1.000	0.864
0.350	0.010	0.328	0.558	0.711	0.809	0.873	0.915	0.945	0.967	0.984	1.000	0.852
0.400	0.010	0.305	0.527	0.680	0.783	0.852	0.900	0.934	0.960	0.981	1.000	0.842
0.500	0.010	0.269	0.475	0.627	0.736	0.814	0.870	0.912	0.945	0.974	1.000	0.822
0.600	0.010	0.243	0.436	0.584	0.696	0.779	0.842	0.892	0.932	0.967	1.000	0.806
0.700	0.010	0.223	0.404	0.548	0.661	0.749	0.818	0.873	0.920	0.961	1.000	0.791
0.800	0.010	0.207	0.378	0.518	0.631	0.722	0.795	0.856	0.908	0.955	1.000	0.775
1.000	0.010	0.183	0.337	0.470	0.583	0.677	0.757	0.827	0.888	0.945	1.000	0.757
1.250	0.010	0.162	0.302	0.428	0.538	0.635	0.720	0.797	0.868	0.935	1.000	0.737
1.500	0.010	0.148	0.278	0.397	0.505	0.603	0.693	0.775	0.853	0.927	1.000	0.722
1.750	0.010	0.138	0.261	0.375	0.481	0.580	0.672	0.758	0.841	0.921	1.000	0.710
2.000	0.010	0.131	0.248	0.359	0.463	0.562	0.656	0.746	0.832	0.917	1.000	0.700
2.500	0.010	0.122	0.231	0.337	0.439	0.538	0.634	0.723	0.820	0.910	1.000	0.690
3.000	0.010	0.116	0.221	0.325	0.426	0.525	0.622	0.718	0.812	0.906	1.000	0.682
3.500	0.010	0.113	0.216	0.317	0.418	0.517	0.615	0.712	0.808	0.904	1.000	0.679
4.000	0.010	0.112	0.213	0.313	0.413	0.512	0.610	0.708	0.805	0.903	1.000	0.676
5.000	0.010	0.110	0.210	0.309	0.408	0.507	0.606	0.705	0.803	0.902	1.000	0.674
6.000	0.010	0.109	0.209	0.308	0.407	0.506	0.605	0.704	0.802	0.901	1.000	0.673
7.000	0.010	0.109	0.208	0.307	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.673

SLIP COEFF(B)=   0.0   INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.005	-0.699	-0.209	-0.047	-0.008	-0.001	-0.000	0.0	0.0	0.0	0.0	0.0
0.010	-0.668	-0.225	-0.063	-0.018	-0.005	-0.001	-0.000	0.0	0.0	0.0	0.0
0.015	-0.641	-0.237	-0.077	-0.026	-0.009	-0.003	-0.001	-0.000	0.0	0.0	0.0
0.020	-0.617	-0.247	-0.088	-0.033	-0.013	-0.004	-0.001	-0.000	-0.000	0.0	0.0
0.030	-0.576	-0.261	-0.106	-0.046	-0.020	-0.009	-0.004	-0.001	-0.000	-0.000	-0.000
0.040	-0.543	-0.270	-0.121	-0.056	-0.027	-0.013	-0.006	-0.003	-0.001	-0.000	-0.000
0.050	-0.515	-0.276	-0.132	-0.066	-0.034	-0.018	-0.009	-0.005	-0.002	-0.001	-0.001
0.060	-0.491	-0.279	-0.142	-0.074	-0.040	-0.022	-0.012	-0.006	-0.003	-0.002	-0.001
0.080	-0.452	-0.282	-0.157	-0.088	-0.051	-0.030	-0.018	-0.011	-0.006	-0.004	-0.003
0.100	-0.422	-0.282	-0.168	-0.100	-0.061	-0.037	-0.023	-0.015	-0.010	-0.007	-0.006
0.125	-0.393	-0.279	-0.178	-0.111	-0.071	-0.046	-0.030	-0.020	-0.014	-0.011	-0.010
0.150	-0.369	-0.274	-0.184	-0.120	-0.079	-0.053	-0.036	-0.025	-0.018	-0.015	-0.014
0.175	-0.350	-0.270	-0.188	-0.128	-0.087	-0.060	-0.042	-0.030	-0.023	-0.019	-0.017
0.200	-0.335	-0.265	-0.191	-0.134	-0.093	-0.066	-0.047	-0.035	-0.027	-0.023	-0.021
0.250	-0.309	-0.255	-0.194	-0.142	-0.104	-0.076	-0.057	-0.043	-0.035	-0.030	-0.029
0.300	-0.290	-0.247	-0.194	-0.148	-0.111	-0.084	-0.065	-0.051	-0.042	-0.037	-0.036
0.350	-0.274	-0.238	-0.193	-0.151	-0.117	-0.091	-0.072	-0.058	-0.049	-0.044	-0.042
0.400	-0.261	-0.231	-0.191	-0.154	-0.122	-0.097	-0.078	-0.064	-0.055	-0.050	-0.048
0.500	-0.241	-0.218	-0.187	-0.156	-0.128	-0.105	-0.088	-0.075	-0.066	-0.061	-0.059
0.600	-0.226	-0.208	-0.182	-0.156	-0.132	-0.112	-0.095	-0.083	-0.075	-0.070	-0.068
0.700	-0.214	-0.199	-0.178	-0.155	-0.134	-0.116	-0.101	-0.090	-0.082	-0.078	-0.076
0.800	-0.204	-0.192	-0.174	-0.154	-0.136	-0.120	-0.106	-0.096	-0.089	-0.084	-0.082
1.000	-0.188	-0.180	-0.166	-0.152	-0.137	-0.124	-0.113	-0.105	-0.099	-0.095	-0.094
1.250	-0.174	-0.168	-0.159	-0.148	-0.138	-0.128	-0.120	-0.113	-0.108	-0.105	-0.104
1.500	-0.165	-0.160	-0.153	-0.145	-0.137	-0.130	-0.124	-0.118	-0.115	-0.113	-0.112
1.750	-0.157	-0.154	-0.149	-0.143	-0.137	-0.131	-0.126	-0.122	-0.120	-0.118	-0.117
2.000	-0.152	-0.149	-0.146	-0.141	-0.136	-0.132	-0.128	-0.125	-0.123	-0.122	-0.121
2.500	-0.145	-0.143	-0.141	-0.138	-0.136	-0.133	-0.131	-0.129	-0.128	-0.127	-0.127
3.000	-0.140	-0.140	-0.138	-0.137	-0.135	-0.134	-0.132	-0.131	-0.131	-0.130	-0.130
3.500	-0.138	-0.137	-0.137	-0.136	-0.135	-0.134	-0.133	-0.133	-0.132	-0.132	-0.132
4.000	-0.136	-0.136	-0.136	-0.135	-0.135	-0.134	-0.134	-0.133	-0.133	-0.133	-0.133
5.000	-0.135	-0.135	-0.135	-0.135	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134
6.000	-0.135	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134
7.000	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.491	2.312	2.384	2.517

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.924	0.993	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.973
0.010	0.010	0.904	0.988	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.015	0.010	0.884	0.982	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.020	0.010	0.865	0.976	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.966
0.030	0.010	0.830	0.963	0.989	0.996	0.999	1.000	1.000	1.000	1.000	1.000	0.962
0.040	0.010	0.798	0.950	0.984	0.994	0.998	0.999	1.000	1.000	1.000	1.000	0.958
0.050	0.010	0.768	0.937	0.978	0.991	0.996	0.998	0.999	1.000	1.000	1.000	0.954
0.060	0.010	0.740	0.923	0.972	0.988	0.995	0.998	0.999	0.999	1.000	1.000	0.951
0.080	0.010	0.691	0.897	0.959	0.982	0.991	0.995	0.998	0.999	1.000	1.000	0.944
0.100	0.010	0.649	0.871	0.946	0.975	0.987	0.993	0.996	0.998	0.999	1.000	0.939
0.125	0.010	0.605	0.840	0.928	0.965	0.981	0.990	0.994	0.997	0.999	1.000	0.930
0.150	0.010	0.567	0.811	0.911	0.954	0.975	0.986	0.992	0.995	0.998	1.000	0.923
0.175	0.010	0.534	0.784	0.893	0.943	0.968	0.981	0.989	0.994	0.997	1.000	0.916
0.200	0.010	0.505	0.758	0.876	0.932	0.961	0.977	0.986	0.992	0.996	1.000	0.910
0.250	0.010	0.458	0.712	0.842	0.910	0.946	0.967	0.979	0.988	0.995	1.000	0.898
0.300	0.010	0.421	0.672	0.811	0.887	0.930	0.956	0.972	0.984	0.992	1.000	0.887
0.350	0.010	0.390	0.637	0.782	0.865	0.915	0.945	0.965	0.979	0.990	1.000	0.877
0.400	0.010	0.365	0.606	0.754	0.844	0.899	0.934	0.958	0.975	0.988	1.000	0.869
0.500	0.010	0.324	0.553	0.705	0.804	0.868	0.912	0.942	0.965	0.983	1.000	0.851
0.600	0.010	0.294	0.511	0.664	0.768	0.840	0.890	0.927	0.955	0.979	1.000	0.836
0.700	0.010	0.270	0.476	0.627	0.736	0.813	0.869	0.911	0.945	0.974	1.000	0.822
0.800	0.010	0.250	0.446	0.596	0.706	0.788	0.849	0.897	0.936	0.959	1.000	0.810
1.000	0.010	0.221	0.400	0.544	0.656	0.744	0.814	0.870	0.918	0.950	1.000	0.789
1.250	0.010	0.195	0.357	0.494	0.607	0.700	0.776	0.842	0.899	0.950	1.000	0.768
1.500	0.010	0.176	0.326	0.457	0.568	0.664	0.746	0.817	0.882	0.942	1.000	0.751
1.750	0.010	0.163	0.303	0.428	0.538	0.635	0.721	0.798	0.868	0.935	1.000	0.737
2.000	0.010	0.152	0.285	0.405	0.514	0.612	0.700	0.781	0.857	0.929	1.000	0.726
2.500	0.010	0.137	0.259	0.373	0.479	0.577	0.669	0.756	0.840	0.920	1.000	0.702
3.000	0.010	0.128	0.242	0.351	0.455	0.554	0.649	0.740	0.828	0.914	1.000	0.598
3.500	0.010	0.122	0.231	0.337	0.440	0.539	0.635	0.728	0.820	0.910	1.000	0.590
4.000	0.010	0.118	0.224	0.328	0.429	0.528	0.625	0.720	0.814	0.907	1.000	0.585
5.000	0.010	0.113	0.215	0.317	0.417	0.516	0.614	0.711	0.808	0.904	1.000	0.578
6.000	0.010	0.111	0.211	0.311	0.411	0.510	0.609	0.707	0.805	0.902	1.000	0.575
7.000	0.010	0.110	0.210	0.309	0.408	0.507	0.606	0.705	0.803	0.902	1.000	0.574

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.005	-0.500	-0.152	-0.036	-0.007	-0.001	-0.000	0.0	0.0	0.0	0.0	0.0
0.010	-0.485	-0.160	-0.045	-0.013	-0.003	-0.001	-0.000	0.0	0.0	0.0	0.0
0.015	-0.470	-0.167	-0.052	-0.017	-0.006	-0.002	-0.000	-0.000	0.0	0.0	0.0
0.020	-0.457	-0.173	-0.059	-0.022	-0.008	-0.003	-0.001	-0.000	-0.000	0.0	0.0
0.030	-0.434	-0.182	-0.069	-0.029	-0.013	-0.006	-0.002	-0.001	-0.000	-0.000	0.0
0.040	-0.414	-0.189	-0.079	-0.035	-0.017	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000
0.050	-0.396	-0.194	-0.086	-0.041	-0.021	-0.011	-0.006	-0.003	-0.001	-0.001	-0.000
0.060	-0.381	-0.197	-0.093	-0.046	-0.024	-0.013	-0.007	-0.004	-0.002	-0.001	-0.001
0.080	-0.356	-0.202	-0.103	-0.055	-0.031	-0.018	-0.011	-0.006	-0.004	-0.002	-0.002
0.100	-0.335	-0.204	-0.112	-0.063	-0.037	-0.022	-0.014	-0.009	-0.006	-0.004	-0.004
0.125	-0.314	-0.204	-0.120	-0.071	-0.043	-0.027	-0.018	-0.012	-0.008	-0.006	-0.006
0.150	-0.297	-0.203	-0.126	-0.077	-0.049	-0.032	-0.021	-0.015	-0.011	-0.008	-0.008
0.175	-0.283	-0.202	-0.130	-0.083	-0.054	-0.036	-0.025	-0.018	-0.013	-0.011	-0.010
0.200	-0.271	-0.200	-0.133	-0.088	-0.059	-0.040	-0.028	-0.020	-0.015	-0.013	-0.012
0.250	-0.251	-0.195	-0.138	-0.095	-0.066	-0.047	-0.034	-0.025	-0.020	-0.017	-0.016
0.300	-0.236	-0.190	-0.140	-0.101	-0.072	-0.053	-0.039	-0.030	-0.025	-0.021	-0.020
0.350	-0.224	-0.185	-0.141	-0.105	-0.077	-0.058	-0.044	-0.035	-0.029	-0.025	-0.024
0.400	-0.214	-0.181	-0.142	-0.108	-0.081	-0.062	-0.048	-0.039	-0.032	-0.029	-0.028
0.500	-0.197	-0.173	-0.141	-0.112	-0.088	-0.069	-0.055	-0.046	-0.039	-0.036	-0.034
0.600	-0.185	-0.165	-0.139	-0.114	-0.092	-0.075	-0.061	-0.052	-0.045	-0.042	-0.040
0.700	-0.175	-0.159	-0.137	-0.114	-0.095	-0.079	-0.066	-0.057	-0.051	-0.047	-0.046
0.800	-0.167	-0.154	-0.135	-0.115	-0.097	-0.082	-0.070	-0.061	-0.055	-0.052	-0.051
1.000	-0.155	-0.145	-0.130	-0.114	-0.100	-0.087	-0.077	-0.069	-0.063	-0.060	-0.059
1.250	-0.143	-0.136	-0.125	-0.113	-0.101	-0.091	-0.082	-0.075	-0.071	-0.068	-0.067
1.500	-0.135	-0.129	-0.121	-0.111	-0.102	-0.093	-0.086	-0.080	-0.076	-0.074	-0.073
1.750	-0.128	-0.124	-0.117	-0.109	-0.102	-0.095	-0.089	-0.084	-0.081	-0.079	-0.078
2.000	-0.123	-0.119	-0.114	-0.108	-0.102	-0.096	-0.091	-0.087	-0.084	-0.083	-0.082
2.500	-0.115	-0.113	-0.109	-0.105	-0.101	-0.097	-0.094	-0.091	-0.089	-0.088	-0.088
3.000	-0.110	-0.109	-0.106	-0.104	-0.101	-0.098	-0.096	-0.094	-0.093	-0.092	-0.092
3.500	-0.107	-0.106	-0.104	-0.102	-0.100	-0.099	-0.097	-0.096	-0.095	-0.094	-0.094
4.000	-0.105	-0.104	-0.103	-0.101	-0.100	-0.099	-0.098	-0.097	-0.096	-0.096	-0.096
5.000	-0.102	-0.102	-0.101	-0.100	-0.100	-0.099	-0.099	-0.098	-0.098	-0.098	-0.098
6.000	-0.101	-0.100	-0.100	-0.100	-0.100	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099
7.000	-0.100	-0.100	-0.100	-0.100	-0.100	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.555	2.370	2.381	2.529

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.925	0.994	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.973
0.010	0.010	0.908	0.989	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.015	0.010	0.892	0.984	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.020	0.010	0.876	0.979	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.030	0.010	0.846	0.969	0.991	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.964
0.040	0.010	0.819	0.958	0.987	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.961
0.050	0.010	0.793	0.948	0.983	0.993	0.997	0.999	0.999	1.000	1.000	1.000	0.958
0.060	0.010	0.768	0.937	0.978	0.991	0.996	0.998	0.999	1.000	1.000	1.000	0.954
0.080	0.010	0.724	0.915	0.968	0.986	0.993	0.997	0.998	0.999	1.000	1.000	0.949
0.100	0.010	0.686	0.893	0.957	0.981	0.990	0.995	0.997	0.999	0.999	1.000	0.943
0.125	0.010	0.644	0.867	0.944	0.973	0.986	0.992	0.996	0.998	0.999	1.000	0.937
0.150	0.010	0.607	0.842	0.929	0.965	0.981	0.989	0.994	0.997	0.998	1.000	0.930
0.175	0.010	0.575	0.818	0.915	0.956	0.976	0.986	0.992	0.995	0.998	1.000	0.925
0.200	0.010	0.547	0.795	0.900	0.947	0.970	0.983	0.990	0.994	0.997	1.000	0.919
0.250	0.010	0.500	0.753	0.872	0.929	0.959	0.975	0.985	0.991	0.996	1.000	0.908
0.300	0.010	0.462	0.716	0.845	0.911	0.946	0.967	0.980	0.988	0.994	1.000	0.893
0.350	0.010	0.430	0.682	0.819	0.892	0.934	0.958	0.974	0.985	0.993	1.000	0.883
0.400	0.010	0.403	0.652	0.794	0.874	0.921	0.949	0.968	0.981	0.991	1.000	0.881
0.500	0.010	0.360	0.600	0.749	0.839	0.895	0.931	0.956	0.973	0.987	1.000	0.866
0.600	0.010	0.327	0.557	0.709	0.807	0.870	0.913	0.943	0.965	0.984	1.000	0.852
0.700	0.010	0.301	0.521	0.674	0.777	0.847	0.895	0.930	0.957	0.980	1.000	0.839
0.800	0.010	0.280	0.491	0.643	0.749	0.824	0.878	0.918	0.949	0.976	1.000	0.828
1.000	0.010	0.247	0.441	0.590	0.701	0.783	0.845	0.894	0.934	0.968	1.000	0.808
1.250	0.010	0.218	0.395	0.538	0.651	0.740	0.810	0.867	0.916	0.959	1.000	0.787
1.500	0.010	0.197	0.361	0.498	0.611	0.703	0.779	0.844	0.900	0.951	1.000	0.769
1.750	0.010	0.181	0.334	0.466	0.578	0.673	0.753	0.823	0.886	0.944	1.000	0.755
2.000	0.010	0.168	0.313	0.440	0.551	0.647	0.731	0.796	0.874	0.938	1.000	0.743
2.500	0.010	0.150	0.282	0.401	0.510	0.608	0.697	0.778	0.855	0.929	1.000	0.724
3.000	0.010	0.138	0.261	0.375	0.481	0.580	0.672	0.758	0.841	0.921	1.000	0.712
3.500	0.010	0.130	0.246	0.356	0.461	0.560	0.654	0.744	0.831	0.916	1.000	0.703
4.000	0.010	0.124	0.236	0.343	0.446	0.545	0.640	0.733	0.823	0.912	1.000	0.693
5.000	0.010	0.117	0.223	0.326	0.427	0.526	0.624	0.719	0.813	0.907	1.000	0.684
6.000	0.010	0.113	0.216	0.317	0.418	0.517	0.615	0.712	0.808	0.904	1.000	0.679
7.000	0.010	0.111	0.212	0.313	0.412	0.511	0.610	0.708	0.805	0.903	1.000	0.676

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.005	-0.411	-0.125	-0.030	-0.006	-0.001	-0.000	0.0	0.0	0.0	0.0	0.0
0.010	-0.400	-0.131	-0.036	-0.010	-0.003	-0.001	-0.000	0.0	0.0	0.0	0.0
0.015	-0.390	-0.136	-0.042	-0.014	-0.005	-0.001	-0.000	-0.000	0.0	0.0	0.0
0.020	-0.381	-0.141	-0.046	-0.017	-0.006	-0.002	-0.001	-0.000	0.0	0.0	0.0
0.030	-0.365	-0.147	-0.054	-0.022	-0.010	-0.004	-0.002	-0.001	-0.000	-0.000	0.0
0.040	-0.350	-0.153	-0.061	-0.027	-0.013	-0.006	-0.003	-0.001	-0.001	-0.000	-0.000
0.050	-0.337	-0.157	-0.067	-0.031	-0.015	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000
0.060	-0.326	-0.160	-0.072	-0.035	-0.018	-0.010	-0.005	-0.003	-0.002	-0.001	-0.001
0.080	-0.306	-0.164	-0.080	-0.042	-0.023	-0.013	-0.008	-0.005	-0.003	-0.002	-0.001
0.100	-0.290	-0.167	-0.087	-0.047	-0.027	-0.016	-0.010	-0.006	-0.004	-0.003	-0.003
0.125	-0.273	-0.168	-0.094	-0.054	-0.032	-0.020	-0.013	-0.008	-0.006	-0.004	-0.004
0.150	-0.259	-0.168	-0.099	-0.059	-0.036	-0.023	-0.015	-0.011	-0.008	-0.006	-0.006
0.175	-0.247	-0.168	-0.103	-0.063	-0.040	-0.026	-0.018	-0.013	-0.009	-0.008	-0.007
0.200	-0.237	-0.167	-0.106	-0.067	-0.044	-0.029	-0.020	-0.015	-0.011	-0.009	-0.009
0.250	-0.221	-0.164	-0.111	-0.074	-0.050	-0.035	-0.025	-0.018	-0.014	-0.012	-0.012
0.300	-0.208	-0.161	-0.114	-0.079	-0.055	-0.039	-0.029	-0.022	-0.018	-0.015	-0.014
0.350	-0.197	-0.158	-0.116	-0.083	-0.059	-0.043	-0.033	-0.025	-0.021	-0.018	-0.017
0.400	-0.189	-0.155	-0.117	-0.086	-0.063	-0.047	-0.036	-0.028	-0.023	-0.021	-0.020
0.500	-0.175	-0.149	-0.117	-0.090	-0.069	-0.053	-0.042	-0.034	-0.029	-0.026	-0.025
0.600	-0.164	-0.143	-0.117	-0.092	-0.073	-0.058	-0.046	-0.039	-0.033	-0.030	-0.029
0.700	-0.156	-0.138	-0.116	-0.094	-0.076	-0.061	-0.051	-0.043	-0.037	-0.034	-0.033
0.800	-0.148	-0.134	-0.114	-0.095	-0.078	-0.064	-0.054	-0.046	-0.041	-0.038	-0.037
1.000	-0.137	-0.127	-0.111	-0.095	-0.081	-0.069	-0.060	-0.052	-0.047	-0.045	-0.044
1.250	-0.127	-0.119	-0.107	-0.095	-0.083	-0.073	-0.065	-0.058	-0.054	-0.051	-0.050
1.500	-0.119	-0.113	-0.104	-0.094	-0.084	-0.076	-0.068	-0.063	-0.059	-0.057	-0.056
1.750	-0.113	-0.109	-0.101	-0.093	-0.085	-0.077	-0.071	-0.066	-0.063	-0.061	-0.060
2.000	-0.109	-0.105	-0.098	-0.092	-0.085	-0.079	-0.073	-0.069	-0.066	-0.064	-0.064
2.500	-0.101	-0.099	-0.094	-0.089	-0.085	-0.080	-0.076	-0.073	-0.071	-0.070	-0.069
3.000	-0.096	-0.094	-0.091	-0.088	-0.084	-0.081	-0.078	-0.076	-0.074	-0.073	-0.073
3.500	-0.093	-0.091	-0.089	-0.087	-0.084	-0.082	-0.080	-0.078	-0.077	-0.076	-0.076
4.000	-0.090	-0.089	-0.088	-0.086	-0.084	-0.082	-0.080	-0.079	-0.078	-0.078	-0.078
5.000	-0.087	-0.086	-0.085	-0.084	-0.083	-0.082	-0.082	-0.081	-0.080	-0.080	-0.080
6.000	-0.085	-0.085	-0.084	-0.084	-0.083	-0.083	-0.082	-0.082	-0.082	-0.081	-0.081
7.000	-0.084	-0.084	-0.084	-0.083	-0.083	-0.083	-0.083	-0.082	-0.082	-0.082	-0.082

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.585	2.404	2.378	2.522

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.926	0.994	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.972
0.010	0.010	0.911	0.990	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.015	0.010	0.897	0.986	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.020	0.010	0.883	0.981	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.030	0.010	0.857	0.973	0.993	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.040	0.010	0.832	0.964	0.989	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.962
0.050	0.010	0.808	0.954	0.986	0.994	0.998	0.999	1.000	1.000	1.000	1.000	0.959
0.060	0.010	0.786	0.945	0.982	0.993	0.997	0.998	0.999	1.000	1.000	1.000	0.957
0.080	0.010	0.746	0.926	0.973	0.989	0.995	0.997	0.999	0.999	1.000	1.000	0.951
0.100	0.010	0.710	0.907	0.964	0.984	0.992	0.996	0.998	0.999	1.000	1.000	0.947
0.125	0.010	0.670	0.884	0.952	0.978	0.989	0.994	0.997	0.998	0.999	1.000	0.941
0.150	0.010	0.635	0.861	0.940	0.971	0.985	0.991	0.995	0.997	0.999	1.000	0.935
0.175	0.010	0.604	0.840	0.928	0.964	0.980	0.989	0.993	0.996	0.998	1.000	0.930
0.200	0.010	0.577	0.819	0.915	0.956	0.976	0.986	0.992	0.995	0.998	1.000	0.925
0.250	0.010	0.530	0.780	0.890	0.941	0.966	0.980	0.988	0.993	0.997	1.000	0.916
0.300	0.010	0.491	0.745	0.866	0.925	0.956	0.973	0.984	0.990	0.996	1.000	0.906
0.350	0.010	0.459	0.713	0.842	0.909	0.945	0.966	0.979	0.988	0.994	1.000	0.892
0.400	0.010	0.432	0.684	0.820	0.893	0.934	0.958	0.974	0.985	0.993	1.000	[illegible]
0.500	0.010	0.387	0.633	0.778	0.862	0.912	0.943	0.964	0.978	0.990	1.000	0.876
0.600	0.010	0.353	0.590	0.740	0.832	0.890	0.927	0.953	0.972	0.987	1.000	0.862
0.700	0.010	0.325	0.554	0.706	0.804	0.868	0.911	0.942	0.965	0.983	1.000	0.851
0.800	0.010	0.303	0.523	0.676	0.778	0.848	0.896	0.931	0.958	0.980	1.000	0.842
1.000	0.010	0.268	0.472	0.623	0.732	0.810	0.866	0.909	0.944	0.973	1.000	0.821
1.250	0.010	0.236	0.424	0.571	0.683	0.767	0.833	0.884	0.927	0.965	1.000	0.800
1.500	0.010	0.213	0.387	0.529	0.642	0.731	0.803	0.862	0.912	0.957	1.000	0.783
1.750	0.010	0.196	0.359	0.495	0.608	0.701	0.777	0.842	0.899	0.951	1.000	0.768
2.000	0.010	0.182	0.335	0.468	0.580	0.674	0.755	0.824	0.887	0.945	1.000	0.756
2.500	0.010	0.161	0.301	0.425	0.535	0.632	0.718	0.796	0.867	0.934	1.000	0.736
3.000	0.010	0.148	0.277	0.395	0.503	0.601	0.691	0.774	0.852	0.927	1.000	0.721
3.500	0.010	0.138	0.260	0.374	0.480	0.578	0.670	0.757	0.840	0.921	1.000	[illegible]
4.000	0.010	0.131	0.247	0.357	0.462	0.561	0.655	0.744	0.831	0.916	1.000	0.701
5.000	0.010	0.121	0.230	0.336	0.438	0.537	0.634	0.727	0.819	0.910	1.000	0.692
6.000	0.010	0.116	0.221	0.324	0.425	0.524	0.621	0.717	0.812	0.906	1.000	0.682
7.000	0.010	0.113	0.216	0.317	0.417	0.516	0.614	0.711	0.808	0.904	1.000	0.679

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.005	-0.357	-0.110	-0.027	-0.005	-0.001	-0.000	0.0	0.0	0.0	0.0	0.0
0.010	-0.349	-0.114	-0.031	-0.009	-0.002	-0.001	-0.000	0.0	0.0	0.0	0.0
0.015	-0.341	-0.118	-0.036	-0.012	-0.004	-0.001	-0.000	-0.000	0.0	0.0	0.0
0.020	-0.334	-0.121	-0.039	-0.014	-0.005	-0.002	-0.001	-0.000	0.0	0.0	0.0
0.030	-0.321	-0.127	-0.046	-0.018	-0.008	-0.004	-0.001	-0.001	-0.000	-0.000	0.0
0.040	-0.310	-0.131	-0.051	-0.022	-0.010	-0.005	-0.002	-0.001	-0.000	-0.000	-0.000
0.050	-0.300	-0.135	-0.056	-0.025	-0.013	-0.006	-0.003	-0.002	-0.001	-0.000	-0.000
0.060	-0.290	-0.137	-0.060	-0.028	-0.015	-0.008	-0.004	-0.002	-0.001	-0.001	-0.001
0.080	-0.274	-0.142	-0.067	-0.034	-0.018	-0.011	-0.006	-0.004	-0.002	-0.001	-0.001
0.100	-0.261	-0.144	-0.073	-0.039	-0.022	-0.013	-0.008	-0.005	-0.003	-0.002	-0.002
0.125	-0.247	-0.146	-0.078	-0.044	-0.026	-0.016	-0.010	-0.007	-0.005	-0.003	-0.003
0.150	-0.235	-0.147	-0.083	-0.048	-0.029	-0.019	-0.012	-0.008	-0.006	-0.005	-0.004
0.175	-0.224	-0.147	-0.087	-0.052	-0.033	-0.021	-0.014	-0.010	-0.007	-0.006	-0.006
0.200	-0.216	-0.146	-0.090	-0.056	-0.036	-0.024	-0.016	-0.012	-0.009	-0.007	-0.007
0.250	-0.201	-0.145	-0.095	-0.061	-0.041	-0.028	-0.020	-0.015	-0.011	-0.010	-0.009
0.300	-0.190	-0.143	-0.098	-0.066	-0.045	-0.032	-0.023	-0.017	-0.014	-0.012	-0.011
0.350	-0.180	-0.140	-0.100	-0.069	-0.049	-0.035	-0.026	-0.020	-0.016	-0.014	-0.013
0.400	-0.172	-0.138	-0.101	-0.072	-0.052	-0.038	-0.029	-0.023	-0.018	-0.016	-0.016
0.500	-0.160	-0.133	-0.102	-0.077	-0.057	-0.043	-0.034	-0.027	-0.023	-0.020	-0.020
0.600	-0.150	-0.129	-0.102	-0.079	-0.061	-0.048	-0.038	-0.031	-0.026	-0.024	-0.023
0.700	-0.142	-0.125	-0.102	-0.081	-0.064	-0.051	-0.041	-0.034	-0.030	-0.027	-0.026
0.800	-0.136	-0.121	-0.101	-0.082	-0.066	-0.054	-0.044	-0.038	-0.033	-0.030	-0.030
1.000	-0.126	-0.115	-0.099	-0.083	-0.070	-0.058	-0.049	-0.043	-0.038	-0.036	-0.035
1.250	-0.117	-0.108	-0.096	-0.083	-0.072	-0.062	-0.054	-0.048	-0.044	-0.042	-0.041
1.500	-0.109	-0.103	-0.093	-0.083	-0.073	-0.065	-0.058	-0.052	-0.048	-0.046	-0.045
1.750	-0.104	-0.099	-0.091	-0.082	-0.074	-0.066	-0.060	-0.055	-0.052	-0.050	-0.049
2.000	-0.099	-0.095	-0.089	-0.081	-0.074	-0.068	-0.062	-0.058	-0.055	-0.053	-0.053
2.500	-0.093	-0.090	-0.085	-0.080	-0.074	-0.069	-0.065	-0.062	-0.060	-0.059	-0.058
3.000	-0.088	-0.085	-0.082	-0.078	-0.074	-0.070	-0.067	-0.065	-0.063	-0.062	-0.062
3.500	-0.084	-0.082	-0.080	-0.077	-0.074	-0.071	-0.069	-0.067	-0.065	-0.065	-0.064
4.000	-0.081	-0.080	-0.078	-0.076	-0.074	-0.072	-0.070	-0.068	-0.067	-0.067	-0.066
5.000	-0.078	-0.077	-0.076	-0.075	-0.073	-0.072	-0.071	-0.070	-0.070	-0.069	-0.069
6.000	-0.076	-0.075	-0.075	-0.074	-0.073	-0.072	-0.072	-0.071	-0.071	-0.071	-0.071
7.000	-0.074	-0.074	-0.074	-0.073	-0.073	-0.072	-0.072	-0.072	-0.072	-0.071	-0.071

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.603	2.429	2.378	2.513

SLIP COEFF(B)= 0.0   INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.926	0.994	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.973
0.010	0.010	0.913	0.990	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.972
0.015	0.010	0.900	0.986	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.020	0.010	0.888	0.983	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.030	0.010	0.864	0.975	0.993	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.966
0.040	0.010	0.841	0.967	0.990	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.963
0.050	0.010	0.820	0.959	0.987	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.961
0.060	0.010	0.799	0.950	0.984	0.994	0.997	0.999	0.999	1.000	1.000	1.000	0.958
0.080	0.010	0.762	0.934	0.977	0.990	0.995	0.998	0.999	0.999	1.000	1.000	0.954
0.100	0.010	0.728	0.917	0.969	0.986	0.993	0.996	0.998	0.999	1.000	1.000	0.949
0.125	0.010	0.690	0.896	0.958	0.981	0.990	0.995	0.997	0.998	0.999	1.000	0.944
0.150	0.010	0.656	0.875	0.948	0.975	0.987	0.993	0.996	0.998	0.999	1.000	0.938
0.175	0.010	0.626	0.855	0.937	0.969	0.983	0.991	0.995	0.997	0.999	1.000	0.934
0.200	0.010	0.599	0.836	0.925	0.962	0.979	0.988	0.993	0.996	0.998	1.000	0.929
0.250	0.010	0.553	0.800	0.903	0.949	0.971	0.983	0.990	0.994	0.997	1.000	0.920
0.300	0.010	0.515	0.766	0.881	0.935	0.962	0.977	0.986	0.992	0.994	1.000	0.912
0.350	0.010	0.482	0.736	0.859	0.921	0.953	0.971	0.982	0.990	0.995	1.000	0.904
0.400	0.010	0.454	0.708	0.838	0.906	0.943	0.965	0.978	0.987	0.994	1.000	0.897
0.500	0.010	0.409	0.658	0.799	0.878	0.923	0.951	0.969	0.982	0.991	1.000	0.883
0.600	0.010	0.373	0.616	0.763	0.850	0.903	0.937	0.959	0.976	0.989	1.000	0.871
0.700	0.010	0.345	0.580	0.731	0.824	0.884	0.923	0.950	0.970	0.986	1.000	0.859
0.800	0.010	0.321	0.549	0.701	0.800	0.865	0.909	0.940	0.963	0.983	1.000	0.849
1.000	0.010	0.284	0.497	0.649	0.755	0.829	0.881	0.920	0.951	0.977	1.000	0.830
1.250	0.010	0.251	0.447	0.597	0.707	0.789	0.850	0.897	0.936	0.969	1.000	0.810
1.500	0.010	0.227	0.409	0.554	0.667	0.753	0.821	0.876	0.922	0.962	1.000	0.790
1.750	0.010	0.208	0.379	0.520	0.632	0.723	0.796	0.856	0.909	0.955	1.000	0.773
2.000	0.010	0.193	0.355	0.491	0.603	0.696	0.773	0.839	0.897	0.950	1.000	0.764
2.500	0.010	0.171	0.317	0.446	0.557	0.653	0.736	0.810	0.877	0.939	1.000	0.744
3.000	0.010	0.156	0.291	0.413	0.522	0.620	0.707	0.787	0.851	0.931	1.000	0.732
3.500	0.010	0.145	0.272	0.389	0.496	0.594	0.685	0.769	0.843	0.925	1.000	0.717
4.000	0.010	0.137	0.257	0.371	0.476	0.575	0.667	0.755	0.839	0.920	1.000	0.708
5.000	0.010	0.126	0.238	0.346	0.449	0.548	0.643	0.735	0.825	0.913	1.000	0.695
6.000	0.010	0.119	0.226	0.331	0.433	0.532	0.628	0.723	0.816	0.908	1.000	0.686
7.000	0.010	0.115	0.219	0.322	0.422	0.522	0.619	0.715	0.811	0.906	1.000	0.691

SLIP COEFF(B)= 0.0 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.005	-0.320	-0.098	-0.024	-0.005	-0.001	-0.000	0.0	0.0	0.0	0.0	0.0
0.010	-0.313	-0.102	-0.028	-0.008	-0.002	-0.001	-0.000	0.0	0.0	0.0	0.0
0.015	-0.307	-0.105	-0.031	-0.010	-0.003	-0.001	-0.000	-0.000	0.0	0.0	0.0
0.020	-0.302	-0.108	-0.034	-0.012	-0.005	-0.002	-0.001	-0.000	0.0	0.0	0.0
0.030	-0.291	-0.113	-0.040	-0.016	-0.007	-0.003	-0.001	-0.001	-0.000	0.0	0.0
0.040	-0.282	-0.117	-0.044	-0.019	-0.009	-0.004	-0.002	-0.001	-0.000	-0.000	-0.000
0.050	-0.273	-0.120	-0.048	-0.022	-0.011	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.060	-0.265	-0.122	-0.052	-0.024	-0.012	-0.007	-0.004	-0.002	-0.001	-0.001	-0.000
0.080	-0.251	-0.126	-0.058	-0.029	-0.016	-0.009	-0.005	-0.003	-0.002	-0.001	-0.001
0.100	-0.240	-0.128	-0.063	-0.033	-0.019	-0.011	-0.007	-0.004	-0.003	-0.002	-0.002
0.125	-0.227	-0.130	-0.068	-0.037	-0.022	-0.013	-0.009	-0.006	-0.004	-0.003	-0.003
0.150	-0.217	-0.131	-0.072	-0.041	-0.025	-0.016	-0.010	-0.007	-0.005	-0.004	-0.004
0.175	-0.208	-0.132	-0.076	-0.045	-0.028	-0.018	-0.012	-0.008	-0.006	-0.005	-0.005
0.200	-0.200	-0.132	-0.079	-0.048	-0.030	-0.020	-0.014	-0.010	-0.007	-0.006	-0.006
0.250	-0.187	-0.131	-0.083	-0.053	-0.035	-0.024	-0.017	-0.012	-0.009	-0.008	-0.007
0.300	-0.176	-0.129	-0.086	-0.057	-0.038	-0.027	-0.019	-0.014	-0.011	-0.010	-0.009
0.350	-0.168	-0.128	-0.088	-0.060	-0.042	-0.030	-0.022	-0.017	-0.013	-0.012	-0.011
0.400	-0.161	-0.126	-0.090	-0.063	-0.045	-0.032	-0.024	-0.019	-0.015	-0.013	-0.013
0.500	-0.149	-0.122	-0.092	-0.067	-0.049	-0.037	-0.028	-0.023	-0.019	-0.017	-0.016
0.600	-0.140	-0.118	-0.092	-0.070	-0.053	-0.041	-0.032	-0.026	-0.022	-0.020	-0.019
0.700	-0.133	-0.115	-0.092	-0.072	-0.056	-0.044	-0.035	-0.029	-0.025	-0.023	-0.022
0.800	-0.127	-0.111	-0.092	-0.073	-0.058	-0.047	-0.038	-0.032	-0.028	-0.025	-0.025
1.000	-0.118	-0.106	-0.090	-0.075	-0.061	-0.051	-0.043	-0.037	-0.032	-0.030	-0.029
1.250	-0.109	-0.100	-0.088	-0.075	-0.064	-0.054	-0.047	-0.041	-0.037	-0.035	-0.034
1.500	-0.102	-0.095	-0.086	-0.075	-0.065	-0.057	-0.050	-0.045	-0.041	-0.039	-0.039
1.750	-0.097	-0.092	-0.083	-0.074	-0.066	-0.059	-0.053	-0.048	-0.045	-0.043	-0.042
2.000	-0.093	-0.088	-0.081	-0.074	-0.067	-0.060	-0.055	-0.051	-0.048	-0.046	-0.045
2.500	-0.086	-0.083	-0.078	-0.072	-0.067	-0.062	-0.058	-0.054	-0.052	-0.051	-0.050
3.000	-0.082	-0.079	-0.075	-0.071	-0.067	-0.063	-0.060	-0.057	-0.055	-0.054	-0.054
3.500	-0.078	-0.076	-0.073	-0.070	-0.067	-0.064	-0.061	-0.059	-0.058	-0.057	-0.056
4.000	-0.075	-0.074	-0.072	-0.069	-0.067	-0.064	-0.062	-0.061	-0.059	-0.059	-0.058
5.000	-0.072	-0.071	-0.069	-0.068	-0.066	-0.065	-0.064	-0.063	-0.062	-0.061	-0.061
6.000	-0.069	-0.069	-0.068	-0.067	-0.066	-0.065	-0.064	-0.064	-0.063	-0.063	-0.063
7.000	-0.068	-0.068	-0.067	-0.066	-0.066	-0.065	-0.065	-0.064	-0.064	-0.064	-0.064

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.615	2.448	2.378	2.504

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 0.0

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.837	0.972	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.964
0.010	0.010	0.573	0.883	0.972	0.994	0.999	1.000	1.000	1.000	1.000	1.000	0.932
0.015	0.010	0.442	0.770	0.925	0.979	0.995	0.999	1.000	1.000	1.000	1.000	0.913
0.020	0.010	0.384	0.685	0.868	0.953	0.985	0.996	0.999	1.000	1.000	1.000	0.897
0.030	0.010	0.302	0.575	0.769	0.889	0.953	0.982	0.993	0.998	0.999	1.000	0.871
0.040	0.010	0.259	0.502	0.695	0.828	0.911	0.958	0.982	0.993	0.998	1.000	0.848
0.050	0.010	0.227	0.451	0.636	0.775	0.870	0.930	0.965	0.984	0.994	1.000	0.829
0.060	0.010	0.205	0.412	0.590	0.729	0.831	0.901	0.945	0.972	0.989	1.000	0.813
0.080	0.010	0.174	0.355	0.519	0.656	0.764	0.846	0.904	0.946	0.976	1.000	0.784
0.100	0.010	0.153	0.315	0.467	0.600	0.710	0.798	0.866	0.920	0.953	1.000	0.760
0.125	0.010	0.135	0.280	0.420	0.546	0.656	0.749	0.826	0.891	0.948	1.000	0.737
0.150	0.010	0.122	0.255	0.385	0.506	0.615	0.710	0.794	0.868	0.936	1.000	0.719
0.175	0.010	0.113	0.235	0.358	0.475	0.582	0.680	0.769	0.850	0.924	1.000	0.703
0.200	0.010	0.105	0.221	0.338	0.451	0.557	0.656	0.749	0.835	0.912	1.000	0.691
0.250	0.010	0.095	0.199	0.308	0.416	0.521	0.623	0.720	0.815	0.908	1.000	0.674
0.300	0.010	0.089	0.186	0.290	0.395	0.499	0.601	0.702	0.802	0.901	1.000	0.663
0.350	0.010	0.084	0.178	0.278	0.381	0.484	0.588	0.691	0.794	0.897	1.000	0.655
0.400	0.010	0.082	0.172	0.270	0.371	0.475	0.579	0.683	0.788	0.894	1.000	0.651
0.500	0.010	0.079	0.166	0.261	0.361	0.464	0.569	0.675	0.782	0.891	1.000	0.645
0.600	0.010	0.078	0.164	0.258	0.357	0.460	0.565	0.671	0.780	0.889	1.000	0.642
0.700	0.010	0.077	0.162	0.256	0.355	0.458	0.563	0.670	0.779	0.889	1.000	0.642
0.800	0.010	0.077	0.162	0.256	0.355	0.457	0.562	0.669	0.778	0.889	1.000	0.641
1.000	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.889	1.000	0.641
1.250	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641
1.500	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641
1.750	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641
2.000	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641
2.500	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641
3.000	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641
3.500	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641
4.000	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641
5.000	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641
6.000	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641
7.000	0.010	0.077	0.162	0.255	0.354	0.456	0.562	0.669	0.778	0.888	1.000	0.641

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 0.0

FLOWRATE DISTRIBUTION

0.005	-24.394	-1.854	-0.308	-0.052	-0.009	-0.002	-0.000	0.0	0.0	0.0	0.0
0.010	-6.833	-3.115	-0.994	-0.253	-0.058	-0.012	-0.003	-0.001	-0.000	0.0	0.0
0.015	-6.883	-2.612	-1.438	-0.547	-0.170	-0.046	-0.012	-0.003	-0.001	-0.000	0.0
0.020	-5.116	-2.366	-1.501	-0.768	-0.314	-0.108	-0.033	-0.009	-0.002	-0.001	-0.000
0.030	-3.942	-2.055	-1.482	-0.952	-0.533	-0.257	-0.109	-0.042	-0.015	-0.005	-0.003
0.040	-3.147	-1.809	-1.421	-1.004	-0.648	-0.379	-0.200	-0.096	-0.042	-0.019	-0.013
0.050	-2.748	-1.661	-1.342	-1.014	-0.710	-0.461	-0.277	-0.154	-0.081	-0.044	-0.033
0.060	-2.407	-1.524	-1.281	-1.003	-0.742	-0.516	-0.337	-0.208	-0.124	-0.078	-0.064
0.080	-1.991	-1.347	-1.166	-0.967	-0.765	-0.580	-0.422	-0.298	-0.209	-0.157	-0.139
0.100	-1.710	-1.210	-1.081	-0.924	-0.763	-0.611	-0.476	-0.366	-0.285	-0.236	-0.220
0.125	-1.485	-1.097	-0.994	-0.876	-0.751	-0.630	-0.522	-0.431	-0.364	-0.323	-0.309
0.150	-1.318	-1.005	-0.930	-0.835	-0.737	-0.640	-0.553	-0.481	-0.427	-0.394	-0.383
0.175	-1.203	-0.942	-0.877	-0.803	-0.724	-0.647	-0.578	-0.520	-0.476	-0.450	-0.441
0.200	-1.110	-0.887	-0.838	-0.778	-0.714	-0.652	-0.596	-0.550	-0.515	-0.495	-0.488
0.250	-0.987	-0.815	-0.780	-0.741	-0.699	-0.659	-0.623	-0.593	-0.571	-0.558	-0.554
0.300	-0.908	-0.764	-0.744	-0.717	-0.690	-0.664	-0.640	-0.621	-0.607	-0.599	-0.596
0.350	-0.861	-0.736	-0.719	-0.702	-0.684	-0.667	-0.652	-0.639	-0.630	-0.624	-0.622
0.400	-0.828	-0.713	-0.704	-0.692	-0.681	-0.669	-0.659	-0.651	-0.645	-0.641	-0.640
0.500	-0.794	-0.693	-0.686	-0.682	-0.676	-0.672	-0.667	-0.664	-0.661	-0.660	-0.659
0.600	-0.778	-0.681	-0.680	-0.677	-0.675	-0.673	-0.671	-0.669	-0.668	-0.668	-0.667
0.700	-0.773	-0.679	-0.676	-0.675	-0.674	-0.673	-0.672	-0.672	-0.671	-0.671	-0.671
0.800	-0.769	-0.675	-0.675	-0.674	-0.674	-0.673	-0.673	-0.673	-0.672	-0.672	-0.672
1.000	-0.768	-0.676	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
1.250	-0.768	-0.674	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
1.500	-0.768	-0.676	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
1.750	-0.768	-0.674	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
2.000	-0.768	-0.676	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
2.500	-0.768	-0.674	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
3.000	-0.767	-0.676	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
3.500	-0.768	-0.674	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
4.000	-0.767	-0.676	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
5.000	-0.768	-0.674	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
6.000	-0.767	-0.676	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673
7.000	-0.768	-0.674	-0.674	-0.674	-0.674	-0.673	-0.673	-0.673	-0.673	-0.673	-0.673

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	17.201	31.531	45.370	74.822

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.907	0.990	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.879	0.981	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.015	0.010	0.853	0.972	0.993	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.020	0.010	0.829	0.963	0.990	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.962
0.030	0.010	0.783	0.945	0.982	0.993	0.997	0.999	1.000	1.000	1.000	1.000	0.957
0.040	0.010	0.743	0.926	0.974	0.989	0.995	0.998	0.999	1.000	1.000	1.000	0.951
0.050	0.010	0.708	0.907	0.965	0.985	0.993	0.997	0.998	0.999	1.000	1.000	0.946
0.060	0.010	0.675	0.888	0.956	0.980	0.990	0.995	0.998	0.999	1.000	1.000	0.942
0.080	0.010	0.620	0.852	0.936	0.969	0.984	0.992	0.995	0.998	0.999	1.000	0.933
0.100	0.010	0.575	0.819	0.916	0.958	0.977	0.987	0.993	0.996	0.998	1.000	0.925
0.125	0.010	0.528	0.780	0.891	0.942	0.968	0.981	0.989	0.994	0.997	1.000	0.915
0.150	0.010	0.489	0.744	0.867	0.926	0.957	0.975	0.985	0.991	0.996	1.000	0.905
0.175	0.010	0.457	0.712	0.843	0.910	0.947	0.967	0.980	0.989	0.995	1.000	[illegible]
0.200	0.010	0.429	0.683	0.820	0.894	0.936	0.960	0.975	0.986	0.993	1.000	[illegible]
0.250	0.010	0.385	0.632	0.778	0.863	0.913	0.944	0.965	0.979	0.990	1.000	0.876
0.300	0.010	0.350	0.589	0.740	0.833	0.891	0.929	0.954	0.972	0.987	1.000	0.863
0.350	0.010	0.323	0.553	0.706	0.805	0.870	0.913	0.943	0.965	0.984	1.000	0.851
0.400	0.010	0.300	0.521	0.675	0.779	0.849	0.897	0.932	0.958	0.980	1.000	0.840
0.500	0.010	0.264	0.470	0.622	0.732	0.810	0.867	0.910	0.944	0.973	1.000	0.820
0.600	0.010	0.238	0.430	0.579	0.691	0.776	0.840	0.890	0.931	0.967	1.000	0.802
0.700	0.010	0.218	0.398	0.543	0.656	0.745	0.815	0.871	0.918	0.960	1.000	0.788
0.800	0.010	0.202	0.372	0.513	0.626	0.718	0.792	0.854	0.907	0.955	1.000	0.776
1.000	0.010	0.178	0.331	0.464	0.577	0.672	0.754	0.824	0.886	0.944	1.000	0.754
1.250	0.010	0.157	0.296	0.421	0.532	0.629	0.716	0.794	0.866	0.934	1.000	0.734
1.500	0.010	0.143	0.271	0.390	0.499	0.598	0.688	0.772	0.850	0.926	1.000	0.718
1.750	0.010	0.133	0.254	0.368	0.474	0.574	0.667	0.754	0.838	0.920	1.000	0.706
2.000	0.010	0.126	0.241	0.351	0.456	0.556	0.650	0.741	0.829	0.915	1.000	0.697
2.500	0.010	0.116	0.223	0.329	0.431	0.531	0.628	0.723	0.816	0.908	1.000	0.685
3.000	0.010	0.111	0.214	0.316	0.417	0.517	0.615	0.712	0.809	0.904	1.000	0.678
3.500	0.010	0.108	0.208	0.309	0.409	0.509	0.608	0.706	0.804	0.902	1.000	0.674
4.000	0.010	0.106	0.205	0.304	0.404	0.504	0.603	0.702	0.802	0.901	1.000	0.671
5.000	0.010	0.104	0.201	0.300	0.399	0.499	0.599	0.699	0.799	0.899	1.000	0.668
6.000	0.010	0.103	0.200	0.298	0.397	0.497	0.597	0.697	0.798	0.899	1.000	0.668
7.000	0.010	0.103	0.200	0.298	0.397	0.497	0.597	0.697	0.799	0.899	1.000	0.667

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.005	-0.697	-0.224	-0.058	-0.013	-0.002	-0.000	-0.000	0.0	0.0	0.0	0.0
0.010	-0.668	-0.237	-0.073	-0.023	-0.007	-0.002	-0.000	-0.000	0.0	0.0	0.0
0.015	-0.643	-0.248	-0.086	-0.031	-0.012	-0.004	-0.001	-0.000	-0.000	0.0	0.0
0.020	-0.620	-0.257	-0.096	-0.039	-0.016	-0.006	-0.002	-0.001	-0.000	0.0	0.0
0.030	-0.582	-0.269	-0.114	-0.051	-0.024	-0.011	-0.005	-0.002	-0.001	-0.000	-0.000
0.040	-0.550	-0.277	-0.128	-0.062	-0.031	-0.016	-0.008	-0.004	-0.002	-0.001	-0.001
0.050	-0.523	-0.282	-0.139	-0.071	-0.038	-0.021	-0.012	-0.006	-0.003	-0.002	-0.001
0.060	-0.500	-0.285	-0.149	-0.079	-0.044	-0.025	-0.015	-0.008	-0.005	-0.003	-0.003
0.080	-0.462	-0.287	-0.163	-0.093	-0.055	-0.034	-0.021	-0.013	-0.008	-0.006	-0.005
0.100	-0.433	-0.286	-0.174	-0.105	-0.065	-0.041	-0.027	-0.018	-0.012	-0.009	-0.008
0.125	-0.404	-0.284	-0.183	-0.116	-0.075	-0.050	-0.033	-0.023	-0.017	-0.013	-0.012
0.150	-0.381	-0.279	-0.189	-0.125	-0.084	-0.057	-0.040	-0.029	-0.022	-0.018	-0.017
0.175	-0.362	-0.275	-0.193	-0.132	-0.091	-0.064	-0.046	-0.034	-0.026	-0.022	-0.021
0.200	-0.346	-0.270	-0.196	-0.138	-0.098	-0.070	-0.051	-0.038	-0.030	-0.026	-0.025
0.250	-0.321	-0.261	-0.199	-0.147	-0.108	-0.080	-0.061	-0.047	-0.039	-0.034	-0.032
0.300	-0.301	-0.252	-0.199	-0.152	-0.116	-0.088	-0.069	-0.055	-0.046	-0.041	-0.039
0.350	-0.285	-0.244	-0.198	-0.156	-0.122	-0.095	-0.076	-0.062	-0.053	-0.048	-0.046
0.400	-0.272	-0.237	-0.196	-0.158	-0.126	-0.101	-0.082	-0.068	-0.059	-0.054	-0.052
0.500	-0.252	-0.224	-0.192	-0.161	-0.133	-0.110	-0.092	-0.079	-0.070	-0.065	-0.063
0.600	-0.236	-0.214	-0.188	-0.161	-0.137	-0.116	-0.100	-0.087	-0.079	-0.074	-0.072
0.700	-0.224	-0.205	-0.183	-0.160	-0.139	-0.121	-0.106	-0.094	-0.087	-0.082	-0.080
0.800	-0.214	-0.197	-0.179	-0.159	-0.141	-0.124	-0.111	-0.100	-0.093	-0.089	-0.087
1.000	-0.198	-0.185	-0.172	-0.157	-0.142	-0.129	-0.118	-0.110	-0.103	-0.100	-0.099
1.250	-0.184	-0.174	-0.165	-0.154	-0.143	-0.133	-0.124	-0.118	-0.113	-0.110	-0.109
1.500	-0.173	-0.166	-0.159	-0.151	-0.143	-0.135	-0.129	-0.123	-0.120	-0.117	-0.117
1.750	-0.166	-0.160	-0.155	-0.148	-0.142	-0.136	-0.131	-0.127	-0.125	-0.123	-0.122
2.000	-0.160	-0.155	-0.151	-0.146	-0.142	-0.137	-0.133	-0.130	-0.128	-0.127	-0.126
2.500	-0.153	-0.149	-0.147	-0.144	-0.141	-0.138	-0.136	-0.134	-0.133	-0.132	-0.132
3.000	-0.148	-0.145	-0.144	-0.142	-0.141	-0.139	-0.138	-0.137	-0.136	-0.135	-0.135
3.500	-0.146	-0.143	-0.142	-0.141	-0.140	-0.139	-0.138	-0.138	-0.137	-0.137	-0.137
4.000	-0.144	-0.142	-0.141	-0.141	-0.140	-0.139	-0.139	-0.139	-0.138	-0.138	-0.138
5.000	-0.143	-0.140	-0.140	-0.140	-0.140	-0.140	-0.139	-0.139	-0.139	-0.139	-0.139
6.000	-0.142	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140
7.000	-0.142	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.631	2.302	1.923	1.226

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.908	0.991	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.889	0.984	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.015	0.010	0.870	0.978	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.020	0.010	0.852	0.972	0.993	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.030	0.010	0.817	0.959	0.988	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.961
0.040	0.010	0.786	0.945	0.982	0.993	0.997	0.999	0.999	1.000	1.000	1.000	0.957
0.050	0.010	0.757	0.932	0.976	0.990	0.996	0.998	0.999	1.000	1.000	1.000	0.953
0.060	0.010	0.730	0.919	0.970	0.987	0.994	0.997	0.999	0.999	1.000	1.000	0.949
0.080	0.010	0.682	0.892	0.957	0.980	0.990	0.995	0.997	0.999	0.999	1.000	0.943
0.100	0.010	0.641	0.866	0.943	0.973	0.986	0.992	0.996	0.998	0.999	1.000	0.936
0.125	0.010	0.597	0.835	0.926	0.963	0.980	0.989	0.993	0.996	0.998	1.000	0.929
0.150	0.010	0.560	0.806	0.908	0.952	0.973	0.985	0.991	0.995	0.998	1.000	0.922
0.175	0.010	0.528	0.779	0.890	0.941	0.966	0.980	0.988	0.993	0.997	1.000	0.915
0.200	0.010	0.500	0.754	0.873	0.930	0.959	0.975	0.985	0.991	0.996	1.000	0.906
0.250	0.010	0.453	0.708	0.839	0.907	0.944	0.965	0.979	0.987	0.994	1.000	0.897
0.300	0.010	0.416	0.668	0.808	0.885	0.928	0.955	0.971	0.983	0.992	1.000	0.886
0.350	0.010	0.386	0.633	0.778	0.863	0.913	0.944	0.964	0.979	0.990	1.000	0.876
0.400	0.010	0.361	0.602	0.751	0.841	0.897	0.932	0.956	0.974	0.988	1.000	0.866
0.500	0.010	0.320	0.549	0.702	0.801	0.866	0.910	0.941	0.964	0.983	1.000	0.849
0.600	0.010	0.290	0.507	0.660	0.765	0.837	0.888	0.925	0.954	0.978	1.000	0.834
0.700	0.010	0.266	0.472	0.624	0.733	0.810	0.867	0.910	0.944	0.973	1.000	0.821
0.800	0.010	0.247	0.442	0.592	0.703	0.786	0.847	0.895	0.935	0.959	1.000	0.808
1.000	0.010	0.217	0.396	0.540	0.653	0.742	0.812	0.869	0.917	0.960	1.000	0.787
1.250	0.010	0.191	0.353	0.490	0.603	0.697	0.774	0.840	0.897	0.950	1.000	0.766
1.500	0.010	0.173	0.322	0.452	0.565	0.660	0.743	0.815	0.881	0.941	1.000	0.748
1.750	0.010	0.159	0.298	0.423	0.534	0.631	0.718	0.795	0.867	0.934	1.000	0.735
2.000	0.010	0.148	0.280	0.401	0.509	0.608	0.697	0.779	0.855	0.929	1.000	0.723
2.500	0.010	0.133	0.254	0.367	0.474	0.573	0.666	0.754	0.838	0.919	1.000	0.706
3.000	0.010	0.124	0.237	0.346	0.450	0.549	0.645	0.736	0.826	0.913	1.000	0.695
3.500	0.010	0.118	0.226	0.331	0.434	0.534	0.630	0.725	0.817	0.909	1.000	0.687
4.000	0.010	0.114	0.218	0.322	0.423	0.523	0.621	0.717	0.812	0.906	1.000	0.681
5.000	0.010	0.109	0.210	0.310	0.410	0.510	0.609	0.707	0.805	0.902	1.000	0.674
6.000	0.010	0.107	0.206	0.305	0.405	0.504	0.603	0.703	0.802	0.901	1.000	0.671
7.000	0.010	0.106	0.204	0.302	0.402	0.501	0.601	0.700	0.800	0.900	1.000	0.670

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.005	-0.495	-0.162	-0.044	-0.010	-0.002	-0.000	-0.000	0.0	0.0	0.0	0.0
0.010	-0.481	-0.169	-0.052	-0.016	-0.005	-0.001	-0.000	-0.000	0.0	0.0	0.0
0.015	-0.467	-0.175	-0.059	-0.021	-0.008	-0.003	-0.001	-0.000	0.0	0.0	0.0
0.020	-0.455	-0.180	-0.065	-0.025	-0.010	-0.004	-0.002	-0.001	-0.000	0.0	0.0
0.030	-0.433	-0.188	-0.075	-0.033	-0.015	-0.007	-0.003	-0.001	-0.001	-0.000	-0.000
0.040	-0.414	-0.194	-0.083	-0.039	-0.019	-0.010	-0.005	-0.003	-0.001	-0.001	-0.000
0.050	-0.398	-0.198	-0.091	-0.044	-0.023	-0.013	-0.007	-0.004	-0.002	-0.001	-0.001
0.060	-0.383	-0.201	-0.097	-0.050	-0.027	-0.015	-0.009	-0.005	-0.003	-0.002	-0.001
0.080	-0.359	-0.205	-0.107	-0.058	-0.033	-0.020	-0.012	-0.008	-0.005	-0.003	-0.003
0.100	-0.339	-0.206	-0.115	-0.066	-0.039	-0.024	-0.016	-0.010	-0.007	-0.005	-0.005
0.125	-0.318	-0.207	-0.123	-0.074	-0.046	-0.029	-0.020	-0.013	-0.010	-0.008	-0.007
0.150	-0.302	-0.206	-0.129	-0.080	-0.051	-0.034	-0.023	-0.016	-0.012	-0.010	-0.009
0.175	-0.288	-0.204	-0.133	-0.086	-0.056	-0.038	-0.027	-0.019	-0.015	-0.012	-0.012
0.200	-0.276	-0.202	-0.136	-0.090	-0.061	-0.042	-0.030	-0.022	-0.017	-0.015	-0.014
0.250	-0.257	-0.197	-0.140	-0.098	-0.069	-0.049	-0.036	-0.028	-0.022	-0.019	-0.018
0.300	-0.241	-0.193	-0.143	-0.103	-0.075	-0.055	-0.041	-0.032	-0.027	-0.023	-0.022
0.350	-0.229	-0.188	-0.144	-0.107	-0.080	-0.060	-0.046	-0.037	-0.031	-0.027	-0.026
0.400	-0.219	-0.183	-0.144	-0.110	-0.084	-0.064	-0.050	-0.041	-0.035	-0.031	-0.030
0.500	-0.203	-0.175	-0.143	-0.114	-0.090	-0.071	-0.058	-0.048	-0.041	-0.038	-0.037
0.600	-0.191	-0.168	-0.142	-0.116	-0.094	-0.077	-0.064	-0.054	-0.048	-0.044	-0.043
0.700	-0.181	-0.162	-0.140	-0.117	-0.097	-0.081	-0.069	-0.059	-0.053	-0.049	-0.048
0.800	-0.173	-0.157	-0.137	-0.117	-0.099	-0.084	-0.073	-0.064	-0.058	-0.054	-0.053
1.000	-0.160	-0.148	-0.133	-0.117	-0.102	-0.089	-0.079	-0.071	-0.065	-0.062	-0.061
1.250	-0.148	-0.139	-0.128	-0.115	-0.104	-0.093	-0.085	-0.078	-0.073	-0.070	-0.069
1.500	-0.140	-0.132	-0.123	-0.114	-0.104	-0.096	-0.088	-0.083	-0.079	-0.076	-0.076
1.750	-0.133	-0.127	-0.120	-0.112	-0.104	-0.097	-0.091	-0.087	-0.083	-0.081	-0.081
2.000	-0.128	-0.122	-0.117	-0.111	-0.104	-0.099	-0.094	-0.090	-0.087	-0.085	-0.085
2.500	-0.120	-0.116	-0.112	-0.108	-0.104	-0.100	-0.097	-0.094	-0.092	-0.091	-0.090
3.000	-0.115	-0.112	-0.109	-0.106	-0.104	-0.101	-0.099	-0.097	-0.095	-0.094	-0.094
3.500	-0.111	-0.109	-0.107	-0.105	-0.103	-0.101	-0.100	-0.098	-0.097	-0.097	-0.097
4.000	-0.109	-0.107	-0.106	-0.104	-0.103	-0.102	-0.101	-0.100	-0.099	-0.099	-0.098
5.000	-0.106	-0.104	-0.104	-0.103	-0.103	-0.102	-0.101	-0.101	-0.101	-0.101	-0.101
6.000	-0.105	-0.103	-0.103	-0.103	-0.102	-0.102	-0.102	-0.102	-0.102	-0.101	-0.101
7.000	-0.104	-0.103	-0.103	-0.103	-0.102	-0.102	-0.102	-0.102	-0.102	-0.102	-0.102

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.717	2.459	2.233	1.908

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.909	0.991	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.893	0.986	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.015	0.010	0.877	0.981	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.020	0.010	0.862	0.976	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.966
0.030	0.010	0.833	0.965	0.990	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.963
0.040	0.010	0.806	0.954	0.986	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.959
0.050	0.010	0.781	0.943	0.981	0.992	0.997	0.998	0.999	1.000	1.000	1.000	0.956
0.060	0.010	0.757	0.932	0.976	0.990	0.995	0.998	0.999	0.999	1.000	1.000	0.953
0.080	0.010	0.715	0.910	0.966	0.985	0.993	0.996	0.998	0.999	1.000	1.000	0.947
0.100	0.010	0.677	0.889	0.955	0.979	0.989	0.994	0.997	0.998	0.999	1.000	0.942
0.125	0.010	0.636	0.862	0.941	0.971	0.985	0.992	0.995	0.997	0.999	1.000	0.935
0.150	0.010	0.600	0.837	0.927	0.963	0.980	0.989	0.993	0.996	0.998	1.000	0.929
0.175	0.010	0.569	0.813	0.912	0.955	0.975	0.985	0.991	0.995	0.998	1.000	0.923
0.200	0.010	0.542	0.791	0.898	0.946	0.969	0.982	0.989	0.994	0.997	1.000	0.919
0.250	0.010	0.495	0.749	0.869	0.927	0.957	0.974	0.984	0.991	0.996	1.000	0.907
0.300	0.010	0.457	0.712	0.842	0.909	0.945	0.966	0.979	0.988	0.994	1.000	0.898
0.350	0.010	0.426	0.678	0.816	0.890	0.932	0.957	0.973	0.984	0.993	1.000	0.889
0.400	0.010	0.399	0.648	0.791	0.872	0.919	0.948	0.967	0.980	0.991	1.000	0.880
0.500	0.010	0.357	0.596	0.746	0.837	0.894	0.930	0.955	0.973	0.987	1.000	0.865
0.600	0.010	0.324	0.554	0.706	0.805	0.869	0.912	0.942	0.965	0.983	1.000	0.851
0.700	0.010	0.298	0.518	0.671	0.774	0.845	0.894	0.929	0.957	0.979	1.000	0.838
0.800	0.010	0.277	0.487	0.640	0.747	0.822	0.876	0.917	0.948	0.975	1.000	0.827
1.000	0.010	0.244	0.438	0.587	0.698	0.781	0.844	0.893	0.933	0.969	1.000	0.806
1.250	0.010	0.215	0.392	0.535	0.648	0.737	0.808	0.866	0.915	0.959	1.000	0.785
1.500	0.010	0.194	0.357	0.495	0.608	0.700	0.777	0.842	0.899	0.951	1.000	0.768
1.750	0.010	0.178	0.330	0.462	0.575	0.670	0.751	0.822	0.885	0.944	1.000	0.752
2.000	0.010	0.165	0.309	0.436	0.548	0.644	0.729	0.804	0.873	0.937	1.000	0.741
2.500	0.010	0.147	0.278	0.397	0.506	0.604	0.694	0.776	0.854	0.928	1.000	0.722
3.000	0.010	0.135	0.257	0.371	0.477	0.576	0.669	0.756	0.839	0.920	1.000	0.708
3.500	0.010	0.127	0.242	0.352	0.456	0.556	0.650	0.741	0.829	0.915	1.000	0.698
4.000	0.010	0.121	0.231	0.338	0.442	0.541	0.637	0.730	0.821	0.911	1.000	0.690
5.000	0.010	0.114	0.218	0.321	0.423	0.522	0.620	0.716	0.811	0.906	1.000	0.681
6.000	0.010	0.110	0.211	0.312	0.412	0.512	0.610	0.708	0.806	0.903	1.000	0.676
7.000	0.010	0.108	0.207	0.307	0.407	0.506	0.605	0.704	0.803	0.901	1.000	0.673

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.005	-0.405	-0.133	-0.037	-0.009	-0.002	-0.000	0.0	0.0	0.0	0.0	0.0
0.010	-0.396	-0.138	-0.042	-0.013	-0.004	-0.001	-0.000	0.0	0.0	0.0	0.0
0.015	-0.386	-0.142	-0.047	-0.017	-0.006	-0.002	-0.001	-0.000	0.0	0.0	0.0
0.020	-0.378	-0.146	-0.051	-0.020	-0.008	-0.003	-0.001	-0.000	-0.000	0.0	0.0
0.030	-0.362	-0.152	-0.059	-0.025	-0.011	-0.005	-0.003	-0.001	-0.000	-0.000	-0.000
0.040	-0.349	-0.157	-0.065	-0.030	-0.015	-0.007	-0.004	-0.002	-0.001	-0.000	-0.000
0.050	-0.337	-0.160	-0.070	-0.034	-0.017	-0.009	-0.005	-0.003	-0.002	-0.001	-0.001
0.060	-0.326	-0.163	-0.075	-0.037	-0.020	-0.011	-0.006	-0.004	-0.002	-0.001	-0.001
0.080	-0.307	-0.167	-0.083	-0.044	-0.025	-0.015	-0.009	-0.006	-0.004	-0.003	-0.002
0.100	-0.291	-0.169	-0.090	-0.050	-0.029	-0.018	-0.011	-0.007	-0.005	-0.004	-0.003
0.125	-0.275	-0.170	-0.096	-0.056	-0.034	-0.022	-0.014	-0.010	-0.007	-0.005	-0.005
0.150	-0.262	-0.170	-0.101	-0.061	-0.038	-0.025	-0.017	-0.012	-0.009	-0.007	-0.007
0.175	-0.250	-0.170	-0.105	-0.066	-0.042	-0.028	-0.019	-0.014	-0.011	-0.009	-0.008
0.200	-0.240	-0.169	-0.108	-0.069	-0.046	-0.031	-0.022	-0.016	-0.012	-0.010	-0.010
0.250	-0.224	-0.166	-0.113	-0.076	-0.052	-0.036	-0.026	-0.020	-0.016	-0.014	-0.013
0.300	-0.211	-0.163	-0.116	-0.081	-0.057	-0.041	-0.030	-0.023	-0.019	-0.017	-0.016
0.350	-0.201	-0.160	-0.118	-0.084	-0.061	-0.045	-0.034	-0.027	-0.022	-0.019	-0.019
0.400	-0.192	-0.156	-0.119	-0.087	-0.065	-0.049	-0.037	-0.030	-0.025	-0.022	-0.021
0.500	-0.178	-0.150	-0.119	-0.092	-0.070	-0.055	-0.043	-0.035	-0.030	-0.027	-0.026
0.600	-0.168	-0.145	-0.119	-0.094	-0.074	-0.059	-0.048	-0.040	-0.035	-0.032	-0.031
0.700	-0.159	-0.140	-0.117	-0.096	-0.077	-0.063	-0.052	-0.044	-0.039	-0.036	-0.035
0.800	-0.152	-0.136	-0.116	-0.097	-0.080	-0.066	-0.056	-0.048	-0.043	-0.040	-0.039
1.000	-0.141	-0.128	-0.113	-0.097	-0.083	-0.071	-0.061	-0.054	-0.049	-0.046	-0.045
1.250	-0.131	-0.121	-0.109	-0.097	-0.085	-0.075	-0.066	-0.060	-0.055	-0.053	-0.052
1.500	-0.123	-0.115	-0.106	-0.096	-0.086	-0.077	-0.070	-0.064	-0.060	-0.058	-0.057
1.750	-0.117	-0.111	-0.103	-0.095	-0.086	-0.079	-0.073	-0.068	-0.064	-0.062	-0.062
2.000	-0.112	-0.107	-0.100	-0.093	-0.087	-0.080	-0.075	-0.071	-0.068	-0.066	-0.065
2.500	-0.104	-0.101	-0.096	-0.091	-0.086	-0.082	-0.078	-0.075	-0.073	-0.071	-0.071
3.000	-0.099	-0.096	-0.093	-0.090	-0.086	-0.083	-0.080	-0.078	-0.076	-0.075	-0.075
3.500	-0.096	-0.093	-0.091	-0.089	-0.086	-0.083	-0.081	-0.080	-0.078	-0.078	-0.078
4.000	-0.093	-0.091	-0.090	-0.088	-0.086	-0.084	-0.082	-0.081	-0.080	-0.080	-0.079
5.000	-0.090	-0.088	-0.087	-0.086	-0.085	-0.084	-0.083	-0.083	-0.082	-0.082	-0.082
6.000	-0.088	-0.087	-0.086	-0.086	-0.085	-0.085	-0.084	-0.084	-0.083	-0.083	-0.083
7.000	-0.087	-0.086	-0.086	-0.085	-0.085	-0.085	-0.084	-0.084	-0.084	-0.084	-0.084

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.753	2.527	2.342	2.152

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (P*)
0.005	0.010	0.910	0.991	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.896	0.987	0.998	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.015	0.010	0.882	0.982	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.020	0.010	0.869	0.978	0.995	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.967
0.030	0.010	0.843	0.969	0.991	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.964
0.040	0.010	0.819	0.959	0.988	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.961
0.050	0.010	0.796	0.950	0.984	0.994	0.997	0.999	0.999	1.000	1.000	1.000	0.958
0.060	0.010	0.775	0.940	0.980	0.992	0.996	0.998	0.999	1.000	1.000	1.000	0.955
0.080	0.010	0.736	0.921	0.971	0.988	0.994	0.997	0.998	0.999	1.000	1.000	0.950
0.100	0.010	0.701	0.902	0.962	0.983	0.991	0.995	0.997	0.999	0.999	1.000	0.945
0.125	0.010	0.662	0.879	0.950	0.976	0.988	0.993	0.996	0.998	0.999	1.000	0.939
0.150	0.010	0.628	0.857	0.938	0.969	0.984	0.991	0.995	0.997	0.999	1.000	0.934
0.175	0.010	0.598	0.835	0.925	0.962	0.979	0.988	0.993	0.996	0.998	1.000	0.929
0.200	0.010	0.571	0.815	0.913	0.955	0.975	0.985	0.991	0.995	0.998	1.000	0.924
0.250	0.010	0.525	0.776	0.888	0.939	0.965	0.979	0.987	0.993	0.997	1.000	0.914
0.300	0.010	0.487	0.741	0.863	0.923	0.955	0.972	0.983	0.990	0.995	1.000	0.905
0.350	0.010	0.455	0.709	0.840	0.907	0.944	0.965	0.978	0.987	0.994	1.000	0.897
0.400	0.010	0.428	0.680	0.817	0.891	0.933	0.957	0.973	0.984	0.993	1.000	0.889
0.500	0.010	0.384	0.630	0.775	0.860	0.910	0.942	0.963	0.978	0.990	1.000	0.875
0.600	0.010	0.350	0.587	0.737	0.830	0.888	0.926	0.952	0.971	0.986	1.000	0.862
0.700	0.010	0.322	0.551	0.703	0.802	0.867	0.910	0.941	0.964	0.983	1.000	0.850
0.800	0.010	0.300	0.520	0.673	0.776	0.846	0.895	0.930	0.957	0.979	1.000	0.839
1.000	0.010	0.265	0.469	0.621	0.730	0.808	0.865	0.908	0.943	0.973	1.000	0.819
1.250	0.010	0.233	0.421	0.568	0.680	0.766	0.831	0.883	0.927	0.965	1.000	0.798
1.500	0.010	0.210	0.384	0.526	0.639	0.729	0.801	0.861	0.911	0.957	1.000	0.782
1.750	0.010	0.193	0.355	0.492	0.605	0.698	0.775	0.841	0.898	0.950	1.000	0.767
2.000	0.010	0.179	0.332	0.465	0.577	0.672	0.753	0.823	0.886	0.944	1.000	0.754
2.500	0.010	0.159	0.297	0.422	0.532	0.630	0.716	0.794	0.865	0.934	1.000	0.734
3.000	0.010	0.145	0.273	0.392	0.500	0.598	0.688	0.772	0.851	0.926	1.000	0.719
3.500	0.010	0.135	0.256	0.370	0.476	0.575	0.668	0.755	0.839	0.920	1.000	0.707
4.000	0.010	0.128	0.243	0.354	0.458	0.557	0.652	0.742	0.830	0.915	1.000	0.699
5.000	0.010	0.118	0.226	0.332	0.434	0.534	0.630	0.725	0.817	0.909	1.000	0.687
6.000	0.010	0.113	0.217	0.320	0.421	0.520	0.618	0.715	0.810	0.905	1.000	0.680
7.000	0.010	0.110	0.211	0.312	0.413	0.512	0.611	0.709	0.806	0.903	1.000	0.676

SLIP COEFF(B)=   0.200   INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.005	-0.352	-0.116	-0.032	-0.008	-0.002	-0.000	0.0	0.0	0.0	0.0	0.0
0.010	-0.344	-0.120	-0.036	-0.011	-0.004	-0.001	-0.000	0.0	0.0	0.0	0.0
0.015	-0.337	-0.123	-0.040	-0.014	-0.005	-0.002	-0.001	-0.000	0.0	0.0	0.0
0.020	-0.331	-0.126	-0.044	-0.016	-0.007	-0.003	-0.001	-0.000	-0.000	0.0	0.0
0.030	-0.319	-0.131	-0.049	-0.021	-0.009	-0.004	-0.002	-0.001	-0.000	-0.000	0.0
0.040	-0.308	-0.135	-0.054	-0.024	-0.012	-0.006	-0.003	-0.002	-0.001	-0.000	-0.000
0.050	-0.298	-0.138	-0.059	-0.028	-0.014	-0.008	-0.004	-0.002	-0.001	-0.001	-0.001
0.060	-0.290	-0.140	-0.063	-0.031	-0.016	-0.009	-0.005	-0.003	-0.002	-0.001	-0.001
0.080	-0.274	-0.144	-0.070	-0.036	-0.020	-0.012	-0.007	-0.004	-0.003	-0.002	-0.002
0.100	-0.261	-0.146	-0.075	-0.041	-0.023	-0.014	-0.009	-0.006	-0.004	-0.003	-0.003
0.125	-0.248	-0.147	-0.081	-0.046	-0.027	-0.017	-0.011	-0.008	-0.005	-0.004	-0.004
0.150	-0.236	-0.148	-0.085	-0.050	-0.031	-0.020	-0.013	-0.009	-0.007	-0.006	-0.005
0.175	-0.226	-0.148	-0.089	-0.054	-0.034	-0.023	-0.015	-0.011	-0.008	-0.007	-0.006
0.200	-0.218	-0.148	-0.092	-0.057	-0.037	-0.025	-0.017	-0.013	-0.010	-0.008	-0.008
0.250	-0.203	-0.146	-0.096	-0.063	-0.042	-0.029	-0.021	-0.016	-0.012	-0.011	-0.010
0.300	-0.192	-0.144	-0.099	-0.067	-0.047	-0.033	-0.024	-0.019	-0.015	-0.013	-0.012
0.350	-0.183	-0.142	-0.101	-0.071	-0.050	-0.036	-0.027	-0.021	-0.017	-0.015	-0.015
0.400	-0.175	-0.139	-0.102	-0.074	-0.053	-0.039	-0.030	-0.024	-0.020	-0.017	-0.017
0.500	-0.162	-0.134	-0.104	-0.078	-0.059	-0.045	-0.035	-0.028	-0.024	-0.021	-0.021
0.600	-0.153	-0.130	-0.104	-0.081	-0.062	-0.049	-0.039	-0.032	-0.028	-0.025	-0.024
0.700	-0.145	-0.126	-0.103	-0.082	-0.065	-0.052	-0.043	-0.036	-0.031	-0.028	-0.028
0.800	-0.139	-0.122	-0.102	-0.084	-0.068	-0.055	-0.046	-0.039	-0.034	-0.032	-0.031
1.000	-0.129	-0.116	-0.100	-0.085	-0.071	-0.059	-0.051	-0.044	-0.040	-0.037	-0.036
1.250	-0.119	-0.110	-0.097	-0.085	-0.073	-0.063	-0.055	-0.049	-0.045	-0.043	-0.042
1.500	-0.112	-0.104	-0.095	-0.084	-0.074	-0.066	-0.059	-0.053	-0.050	-0.047	-0.047
1.750	-0.106	-0.100	-0.092	-0.083	-0.075	-0.068	-0.062	-0.057	-0.053	-0.051	-0.051
2.000	-0.102	-0.097	-0.090	-0.083	-0.075	-0.069	-0.064	-0.059	-0.056	-0.055	-0.054
2.500	-0.095	-0.091	-0.086	-0.081	-0.076	-0.071	-0.067	-0.063	-0.061	-0.060	-0.059
3.000	-0.090	-0.087	-0.084	-0.080	-0.076	-0.072	-0.069	-0.066	-0.064	-0.063	-0.062
3.500	-0.086	-0.084	-0.081	-0.078	-0.075	-0.073	-0.070	-0.068	-0.067	-0.066	-0.066
4.000	-0.084	-0.082	-0.080	-0.077	-0.075	-0.073	-0.071	-0.070	-0.069	-0.058	-0.058
5.000	-0.080	-0.079	-0.077	-0.076	-0.075	-0.073	-0.072	-0.072	-0.071	-0.071	-0.070
6.000	-0.078	-0.077	-0.076	-0.075	-0.075	-0.074	-0.073	-0.073	-0.072	-0.072	-0.072
7.000	-0.077	-0.076	-0.075	-0.075	-0.074	-0.074	-0.074	-0.073	-0.073	-0.073	-0.073

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.775	2.568	2.398	2.276

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.910	0.991	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.971
0.010	0.010	0.897	0.987	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.015	0.010	0.885	0.983	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.969
0.020	0.010	0.873	0.979	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.030	0.010	0.850	0.971	0.992	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.040	0.010	0.828	0.963	0.989	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.962
0.050	0.010	0.807	0.955	0.986	0.995	0.998	0.999	0.999	1.000	1.000	1.000	0.959
0.060	0.010	0.787	0.946	0.982	0.993	0.997	0.998	0.999	1.000	1.000	1.000	0.957
0.080	0.010	0.751	0.929	0.975	0.989	0.995	0.997	0.999	0.999	1.000	1.000	0.952
0.100	0.010	0.718	0.912	0.967	0.985	0.993	0.996	0.998	0.999	1.000	1.000	0.948
0.125	0.010	0.681	0.891	0.956	0.980	0.990	0.994	0.997	0.998	0.999	1.000	0.942
0.150	0.010	0.648	0.870	0.945	0.974	0.986	0.992	0.995	0.997	0.999	1.000	0.937
0.175	0.010	0.619	0.851	0.934	0.967	0.982	0.990	0.994	0.997	0.999	1.000	0.932
0.200	0.010	0.593	0.832	0.923	0.961	0.978	0.987	0.993	0.996	0.998	1.000	0.928
0.250	0.010	0.547	0.795	0.900	0.947	0.970	0.982	0.989	0.994	0.997	1.000	0.919
0.300	0.010	0.510	0.762	0.878	0.933	0.961	0.976	0.986	0.992	0.996	1.000	0.911
0.350	0.010	0.478	0.732	0.857	0.919	0.951	0.970	0.981	0.989	0.995	1.000	0.903
0.400	0.010	0.450	0.704	0.836	0.904	0.942	0.964	0.977	0.987	0.994	1.000	0.896
0.500	0.010	0.405	0.655	0.796	0.876	0.922	0.950	0.968	0.981	0.991	1.000	0.882
0.600	0.010	0.370	0.613	0.760	0.848	0.902	0.936	0.959	0.975	0.989	1.000	0.870
0.700	0.010	0.342	0.577	0.728	0.822	0.882	0.922	0.949	0.969	0.985	1.000	0.859
0.800	0.010	0.318	0.546	0.698	0.798	0.863	0.908	0.939	0.963	0.982	1.000	0.848
1.000	0.010	0.282	0.494	0.647	0.753	0.827	0.880	0.919	0.950	0.976	1.000	0.829
1.250	0.010	0.249	0.445	0.594	0.705	0.787	0.848	0.896	0.935	0.959	1.000	0.809
1.500	0.010	0.224	0.406	0.552	0.664	0.751	0.820	0.875	0.921	0.952	1.000	0.792
1.750	0.010	0.205	0.376	0.517	0.630	0.721	0.794	0.855	0.908	0.955	1.000	0.778
2.000	0.010	0.191	0.352	0.488	0.601	0.694	0.772	0.838	0.896	0.940	1.000	0.765
2.500	0.010	0.168	0.314	0.443	0.554	0.650	0.734	0.808	0.876	0.939	1.000	0.744
3.000	0.010	0.153	0.288	0.410	0.519	0.617	0.705	0.785	0.860	0.931	1.000	0.729
3.500	0.010	0.142	0.268	0.386	0.493	0.592	0.683	0.767	0.847	0.924	1.000	0.716
4.000	0.010	0.134	0.254	0.367	0.473	0.572	0.665	0.753	0.837	0.919	1.000	0.706
5.000	0.010	0.123	0.234	0.342	0.445	0.545	0.640	0.733	0.823	0.912	1.000	0.692
6.000	0.010	0.117	0.223	0.327	0.429	0.528	0.625	0.721	0.814	0.907	1.000	0.684
7.000	0.010	0.113	0.216	0.318	0.419	0.518	0.616	0.713	0.809	0.905	1.000	0.679

SLIP COEFF(B)= 0.200 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.005	-0.315	-0.104	-0.029	-0.007	-0.001	-0.000	0.0	0.0	0.0	0.0	0.0
0.010	-0.309	-0.107	-0.033	-0.010	-0.003	-0.001	-0.000	0.0	0.0	0.0	0.0
0.015	-0.303	-0.110	-0.036	-0.012	-0.005	-0.002	-0.001	-0.000	0.0	0.0	0.0
0.020	-0.298	-0.112	-0.038	-0.014	-0.006	-0.002	-0.001	-0.000	-0.000	0.0	0.0
0.030	-0.288	-0.116	-0.043	-0.018	-0.008	-0.004	-0.002	-0.001	-0.000	-0.000	0.0
0.040	-0.279	-0.120	-0.048	-0.021	-0.010	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.050	-0.271	-0.122	-0.051	-0.024	-0.012	-0.006	-0.004	-0.002	-0.001	-0.001	-0.000
0.060	-0.264	-0.125	-0.055	-0.026	-0.014	-0.008	-0.004	-0.002	-0.001	-0.001	-0.001
0.080	-0.251	-0.128	-0.060	-0.031	-0.017	-0.010	-0.006	-0.004	-0.002	-0.002	-0.001
0.100	-0.239	-0.130	-0.065	-0.035	-0.020	-0.012	-0.008	-0.005	-0.003	-0.003	-0.002
0.125	-0.228	-0.132	-0.070	-0.039	-0.023	-0.014	-0.009	-0.006	-0.005	-0.004	-0.003
0.150	-0.217	-0.133	-0.074	-0.043	-0.026	-0.017	-0.011	-0.008	-0.006	-0.005	-0.004
0.175	-0.209	-0.133	-0.078	-0.046	-0.029	-0.019	-0.013	-0.009	-0.007	-0.006	-0.005
0.200	-0.201	-0.133	-0.080	-0.049	-0.031	-0.021	-0.014	-0.010	-0.008	-0.007	-0.006
0.250	-0.188	-0.132	-0.085	-0.054	-0.036	-0.025	-0.018	-0.013	-0.010	-0.009	-0.008
0.300	-0.178	-0.130	-0.088	-0.058	-0.040	-0.028	-0.020	-0.015	-0.012	-0.011	-0.010
0.350	-0.170	-0.129	-0.090	-0.062	-0.043	-0.031	-0.023	-0.018	-0.014	-0.013	-0.012
0.400	-0.163	-0.127	-0.091	-0.064	-0.046	-0.033	-0.025	-0.020	-0.016	-0.014	-0.014
0.500	-0.151	-0.123	-0.093	-0.068	-0.051	-0.038	-0.029	-0.024	-0.020	-0.018	-0.017
0.600	-0.142	-0.119	-0.093	-0.071	-0.054	-0.042	-0.033	-0.027	-0.023	-0.021	-0.020
0.700	-0.135	-0.116	-0.093	-0.073	-0.057	-0.045	-0.036	-0.030	-0.026	-0.024	-0.023
0.800	-0.129	-0.112	-0.093	-0.074	-0.059	-0.048	-0.039	-0.033	-0.029	-0.026	-0.026
1.000	-0.120	-0.107	-0.091	-0.076	-0.062	-0.052	-0.044	-0.038	-0.033	-0.031	-0.030
1.250	-0.111	-0.101	-0.089	-0.076	-0.065	-0.055	-0.048	-0.042	-0.038	-0.036	-0.035
1.500	-0.104	-0.097	-0.087	-0.076	-0.066	-0.058	-0.051	-0.046	-0.042	-0.040	-0.040
1.750	-0.099	-0.093	-0.085	-0.076	-0.067	-0.060	-0.054	-0.049	-0.046	-0.044	-0.043
2.000	-0.095	-0.089	-0.083	-0.075	-0.068	-0.061	-0.056	-0.052	-0.049	-0.047	-0.046
2.500	-0.088	-0.084	-0.079	-0.074	-0.068	-0.063	-0.059	-0.055	-0.053	-0.052	-0.051
3.000	-0.083	-0.080	-0.077	-0.072	-0.068	-0.064	-0.061	-0.058	-0.056	-0.055	-0.055
3.500	-0.080	-0.077	-0.075	-0.071	-0.068	-0.065	-0.062	-0.060	-0.059	-0.058	-0.057
4.000	-0.077	-0.075	-0.073	-0.070	-0.068	-0.065	-0.063	-0.062	-0.060	-0.060	-0.059
5.000	-0.073	-0.072	-0.071	-0.069	-0.067	-0.066	-0.065	-0.064	-0.063	-0.062	-0.062
6.000	-0.071	-0.070	-0.069	-0.068	-0.067	-0.066	-0.065	-0.065	-0.064	-0.054	-0.064
7.000	-0.070	-0.069	-0.068	-0.068	-0.067	-0.066	-0.066	-0.066	-0.065	-0.065	-0.065

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.789	2.597	2.434	2.350

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 0.0

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.812	0.964	0.993	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.961
0.010	0.010	0.512	0.851	0.960	0.990	0.998	0.999	1.000	1.000	1.000	1.000	0.921
0.015	0.010	0.379	0.717	0.897	0.968	0.991	0.997	0.999	1.000	1.000	1.000	0.902
0.020	0.010	0.327	0.624	0.826	0.931	0.976	0.992	0.998	0.999	1.000	1.000	0.883
0.030	0.010	0.247	0.510	0.713	0.850	0.930	0.970	0.988	0.996	0.999	1.000	0.852
0.040	0.010	0.209	0.436	0.632	0.778	0.876	0.936	0.970	0.987	0.995	1.000	0.827
0.050	0.010	0.180	0.386	0.570	0.718	0.826	0.899	0.946	0.973	0.989	1.000	0.805
0.060	0.010	0.162	0.347	0.522	0.668	0.781	0.863	0.919	0.957	0.981	1.000	0.795
0.080	0.010	0.134	0.294	0.450	0.590	0.706	0.798	0.869	0.923	0.964	1.000	0.753
0.100	0.010	0.117	0.258	0.400	0.532	0.648	0.745	0.825	0.892	0.948	1.000	0.728
0.125	0.010	0.102	0.226	0.355	0.479	0.593	0.693	0.782	0.861	0.932	1.000	0.703
0.150	0.010	0.093	0.204	0.323	0.441	0.552	0.655	0.750	0.837	0.920	1.000	0.685
0.175	0.010	0.085	0.188	0.300	0.413	0.522	0.626	0.725	0.819	0.910	1.000	0.671
0.200	0.010	0.080	0.176	0.282	0.392	0.499	0.605	0.707	0.806	0.903	1.000	0.662
0.250	0.010	0.073	0.160	0.259	0.363	0.469	0.575	0.681	0.787	0.893	1.000	0.644
0.300	0.010	0.069	0.151	0.245	0.346	0.451	0.558	0.667	0.777	0.888	1.000	0.635
0.350	0.010	0.066	0.146	0.237	0.337	0.441	0.548	0.658	0.772	0.884	1.000	0.630
0.400	0.010	0.065	0.142	0.233	0.331	0.435	0.542	0.653	0.767	0.882	1.000	0.627
0.500	0.010	0.063	0.139	0.228	0.325	0.428	0.536	0.648	0.763	0.880	1.000	0.624
0.600	0.010	0.063	0.138	0.226	0.323	0.426	0.534	0.646	0.762	0.880	1.000	0.622
0.700	0.010	0.063	0.138	0.226	0.322	0.425	0.534	0.646	0.761	0.879	1.000	0.622
0.800	0.010	0.063	0.138	0.226	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
1.000	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
1.250	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
1.500	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
1.750	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
2.000	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
2.500	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
3.000	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
3.500	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
4.000	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
5.000	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
6.000	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622
7.000	0.010	0.063	0.138	0.225	0.322	0.425	0.533	0.645	0.761	0.879	1.000	0.622

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 0.0

FLOWRATE DISTRIBUTION

0.005	-37.833	-2.328	-0.434	-0.083	-0.016	-0.003	-0.001	-0.000	0.0	0.0	0.0
0.010	-6.824	-3.955	-1.370	-0.388	-0.100	-0.024	-0.006	-0.001	-0.000	0.0	0.0
0.015	-8.923	-3.149	-1.908	-0.802	-0.277	-0.085	-0.024	-0.006	-0.002	-0.000	-0.000
0.020	-5.879	-2.841	-1.911	-1.070	-0.484	-0.187	-0.064	-0.020	-0.006	-0.002	-0.001
0.030	-4.601	-2.461	-1.843	-1.250	-0.757	-0.401	-0.188	-0.080	-0.032	-0.013	-0.009
0.040	-3.420	-2.140	-1.747	-1.289	-0.878	-0.552	-0.316	-0.166	-0.082	-0.042	-0.031
0.050	-3.040	-1.976	-1.633	-1.282	-0.939	-0.644	-0.414	-0.250	-0.145	-0.088	-0.071
0.060	-2.577	-1.793	-1.554	-1.254	-0.964	-0.703	-0.487	-0.323	-0.210	-0.145	-0.124
0.080	-2.140	-1.592	-1.400	-1.194	-0.975	-0.768	-0.586	-0.439	-0.331	-0.255	-0.243
0.100	-1.798	-1.415	-1.295	-1.131	-0.962	-0.797	-0.648	-0.524	-0.432	-0.375	-0.356
0.125	-1.582	-1.292	-1.184	-1.069	-0.940	-0.814	-0.700	-0.604	-0.532	-0.488	-0.473
0.150	-1.390	-1.174	-1.111	-1.017	-0.920	-0.824	-0.736	-0.663	-0.608	-0.574	-0.563
0.175	-1.290	-1.113	-1.048	-0.981	-0.905	-0.831	-0.763	-0.707	-0.665	-0.639	-0.631
0.200	-1.189	-1.043	-1.007	-0.951	-0.893	-0.836	-0.784	-0.740	-0.708	-0.689	-0.682
0.250	-1.087	-0.976	-0.942	-0.912	-0.877	-0.843	-0.812	-0.786	-0.767	-0.756	-0.752
0.300	-1.010	-0.920	-0.909	-0.888	-0.867	-0.847	-0.828	-0.813	-0.802	-0.795	-0.793
0.350	-0.982	-0.902	-0.885	-0.875	-0.862	-0.849	-0.838	-0.829	-0.822	-0.818	-0.817
0.400	-0.951	-0.877	-0.875	-0.866	-0.859	-0.851	-0.844	-0.839	-0.835	-0.832	-0.831
0.500	-0.935	-0.869	-0.860	-0.858	-0.855	-0.853	-0.850	-0.848	-0.847	-0.846	-0.846
0.600	-0.922	-0.855	-0.857	-0.855	-0.854	-0.853	-0.852	-0.852	-0.851	-0.851	-0.851
0.700	-0.925	-0.861	-0.854	-0.854	-0.854	-0.853	-0.853	-0.853	-0.852	-0.852	-0.852
0.800	-0.919	-0.853	-0.855	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
1.000	-0.922	-0.860	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
1.250	-0.921	-0.852	-0.855	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
1.500	-0.921	-0.860	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
1.750	-0.922	-0.852	-0.855	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
2.000	-0.920	-0.860	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
2.500	-0.922	-0.852	-0.855	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
3.000	-0.919	-0.860	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
3.500	-0.922	-0.852	-0.855	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
4.000	-0.919	-0.860	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
5.000	-0.922	-0.852	-0.855	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
6.000	-0.919	-0.860	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853
7.000	-0.923	-0.852	-0.855	-0.854	-0.854	-0.853	-0.853	-0.853	-0.853	-0.853	-0.853

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	26.266	41.178	51.347	73.132

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 10.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.892	0.987	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.010	0.010	0.865	0.978	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.966
0.015	0.010	0.840	0.969	0.992	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.963
0.020	0.010	0.816	0.959	0.988	0.996	0.999	0.999	1.000	1.000	1.000	1.000	0.961
0.030	0.010	0.772	0.940	0.980	0.992	0.997	0.999	0.999	1.000	1.000	1.000	0.955
0.040	0.010	0.733	0.921	0.972	0.988	0.995	0.998	0.999	0.999	1.000	1.000	0.950
0.050	0.010	0.699	0.902	0.963	0.984	0.992	0.996	0.998	0.999	1.000	1.000	0.945
0.060	0.010	0.667	0.884	0.953	0.979	0.989	0.995	0.997	0.999	0.999	1.000	0.941
0.080	0.010	0.613	0.848	0.933	0.968	0.983	0.991	0.995	0.997	0.999	1.000	0.932
0.100	0.010	0.569	0.814	0.913	0.956	0.976	0.986	0.992	0.996	0.998	1.000	0.924
0.125	0.010	0.523	0.775	0.888	0.940	0.966	0.980	0.988	0.993	0.997	1.000	0.914
0.150	0.010	0.485	0.740	0.864	0.924	0.956	0.973	0.984	0.991	0.996	1.000	0.905
0.175	0.010	0.453	0.708	0.840	0.908	0.945	0.966	0.979	0.988	0.994	1.000	0.897
0.200	0.010	0.426	0.679	0.817	0.892	0.934	0.959	0.974	0.985	0.993	1.000	0.889
0.250	0.010	0.382	0.629	0.775	0.861	0.911	0.943	0.964	0.978	0.990	1.000	0.875
0.300	0.010	0.347	0.586	0.737	0.831	0.889	0.927	0.953	0.972	0.987	1.000	0.862
0.350	0.010	0.320	0.550	0.703	0.803	0.868	0.911	0.942	0.965	0.983	1.000	0.850
0.400	0.010	0.298	0.519	0.672	0.776	0.847	0.895	0.931	0.957	0.980	1.000	0.839
0.500	0.010	0.262	0.467	0.620	0.729	0.808	0.865	0.909	0.943	0.973	1.000	0.819
0.600	0.010	0.236	0.427	0.576	0.689	0.773	0.838	0.888	0.930	0.956	1.000	0.802
0.700	0.010	0.216	0.396	0.540	0.654	0.743	0.813	0.870	0.917	0.950	1.000	0.787
0.800	0.010	0.200	0.369	0.510	0.624	0.716	0.790	0.852	0.906	0.954	1.000	0.775
1.000	0.010	0.176	0.329	0.462	0.575	0.670	0.752	0.822	0.885	0.944	1.000	0.753
1.250	0.010	0.156	0.294	0.419	0.529	0.627	0.714	0.793	0.865	0.933	1.000	0.733
1.500	0.010	0.142	0.269	0.388	0.496	0.595	0.686	0.770	0.849	0.925	1.000	0.717
1.750	0.010	0.132	0.252	0.365	0.472	0.571	0.665	0.753	0.837	0.919	1.000	0.705
2.000	0.010	0.125	0.239	0.349	0.454	0.553	0.648	0.740	0.828	0.914	1.000	0.696
2.500	0.010	0.115	0.222	0.327	0.429	0.529	0.626	0.721	0.815	0.908	1.000	0.684
3.000	0.010	0.110	0.212	0.314	0.415	0.515	0.613	0.711	0.807	0.904	1.000	0.677
3.500	0.010	0.107	0.206	0.306	0.407	0.506	0.606	0.704	0.803	0.901	1.000	0.672
4.000	0.010	0.105	0.203	0.302	0.402	0.501	0.601	0.701	0.800	0.900	1.000	0.570
5.000	0.010	0.103	0.200	0.298	0.397	0.496	0.596	0.697	0.798	0.899	1.000	0.667
6.000	0.010	0.102	0.199	0.296	0.395	0.495	0.595	0.696	0.797	0.899	1.000	0.666
7.000	0.010	0.102	0.198	0.296	0.395	0.494	0.594	0.695	0.796	0.898	1.000	0.666

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 10.000

FLOWRATE DISTRIBUTION

0.005	-0.684	-0.236	-0.069	-0.018	-0.004	-0.001	-0.000	0.0	0.0	0.0	0.0
0.010	-0.657	-0.247	-0.082	-0.028	-0.009	-0.003	-0.001	-0.000	0.0	0.0	0.0
0.015	-0.633	-0.257	-0.094	-0.036	-0.014	-0.006	-0.002	-0.001	-0.000	0.0	0.0
0.020	-0.612	-0.264	-0.104	-0.044	-0.019	-0.008	-0.003	-0.001	-0.000	-0.000	0.0
0.030	-0.575	-0.275	-0.120	-0.056	-0.027	-0.014	-0.007	-0.003	-0.001	-0.001	-0.000
0.040	-0.545	-0.282	-0.134	-0.066	-0.035	-0.019	-0.010	-0.005	-0.003	-0.002	-0.001
0.050	-0.519	-0.286	-0.144	-0.076	-0.042	-0.024	-0.014	-0.008	-0.005	-0.003	-0.002
0.060	-0.497	-0.289	-0.154	-0.084	-0.048	-0.028	-0.017	-0.010	-0.006	-0.004	-0.004
0.080	-0.461	-0.291	-0.168	-0.098	-0.059	-0.037	-0.023	-0.015	-0.010	-0.008	-0.007
0.100	-0.432	-0.290	-0.178	-0.109	-0.068	-0.044	-0.029	-0.020	-0.014	-0.011	-0.010
0.125	-0.404	-0.286	-0.186	-0.120	-0.078	-0.053	-0.036	-0.026	-0.019	-0.016	-0.015
0.150	-0.381	-0.282	-0.192	-0.129	-0.087	-0.060	-0.043	-0.031	-0.024	-0.020	-0.019
0.175	-0.363	-0.278	-0.197	-0.136	-0.094	-0.067	-0.049	-0.036	-0.029	-0.024	-0.023
0.200	-0.347	-0.273	-0.199	-0.142	-0.101	-0.073	-0.054	-0.041	-0.033	-0.029	-0.027
0.250	-0.322	-0.263	-0.202	-0.150	-0.111	-0.083	-0.064	-0.050	-0.041	-0.036	-0.035
0.300	-0.303	-0.255	-0.202	-0.155	-0.119	-0.092	-0.072	-0.058	-0.049	-0.044	-0.042
0.350	-0.287	-0.247	-0.201	-0.159	-0.125	-0.098	-0.079	-0.065	-0.056	-0.050	-0.049
0.400	-0.274	-0.240	-0.200	-0.161	-0.129	-0.104	-0.085	-0.071	-0.062	-0.057	-0.055
0.500	-0.254	-0.227	-0.195	-0.164	-0.136	-0.113	-0.095	-0.082	-0.073	-0.068	-0.066
0.600	-0.238	-0.217	-0.191	-0.164	-0.140	-0.119	-0.103	-0.090	-0.082	-0.077	-0.075
0.700	-0.226	-0.208	-0.186	-0.164	-0.142	-0.124	-0.109	-0.098	-0.090	-0.085	-0.083
0.800	-0.216	-0.201	-0.182	-0.163	-0.144	-0.127	-0.114	-0.103	-0.096	-0.092	-0.090
1.000	-0.200	-0.189	-0.175	-0.160	-0.145	-0.132	-0.121	-0.113	-0.106	-0.103	-0.102
1.250	-0.186	-0.177	-0.168	-0.157	-0.146	-0.136	-0.128	-0.121	-0.116	-0.113	-0.112
1.500	-0.176	-0.169	-0.162	-0.154	-0.146	-0.138	-0.132	-0.126	-0.123	-0.120	-0.120
1.750	-0.168	-0.163	-0.158	-0.152	-0.145	-0.140	-0.135	-0.131	-0.128	-0.126	-0.125
2.000	-0.163	-0.159	-0.154	-0.150	-0.145	-0.140	-0.137	-0.134	-0.131	-0.130	-0.130
2.500	-0.155	-0.152	-0.150	-0.147	-0.144	-0.142	-0.139	-0.137	-0.136	-0.135	-0.135
3.000	-0.151	-0.148	-0.147	-0.145	-0.144	-0.142	-0.141	-0.140	-0.139	-0.138	-0.138
3.500	-0.148	-0.146	-0.145	-0.144	-0.143	-0.143	-0.142	-0.141	-0.141	-0.140	-0.140
4.000	-0.147	-0.145	-0.144	-0.144	-0.143	-0.143	-0.142	-0.142	-0.142	-0.141	-0.141
5.000	-0.145	-0.144	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143	-0.142	-0.142	-0.142
6.000	-0.145	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143
7.000	-0.144	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.813	2.529	2.289	1.856

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 20.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.893	0.988	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.010	0.010	0.874	0.981	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.015	0.010	0.856	0.975	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.020	0.010	0.838	0.968	0.992	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.963
0.030	0.010	0.805	0.955	0.986	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.959
0.040	0.010	0.775	0.941	0.980	0.992	0.997	0.998	0.999	1.000	1.000	1.000	0.955
0.050	0.010	0.746	0.927	0.974	0.989	0.995	0.998	0.999	0.999	1.000	1.000	0.952
0.060	0.010	0.720	0.914	0.968	0.986	0.993	0.997	0.998	0.999	1.000	1.000	0.948
0.080	0.010	0.674	0.887	0.955	0.979	0.989	0.994	0.997	0.998	0.999	1.000	0.941
0.100	0.010	0.634	0.862	0.941	0.971	0.985	0.992	0.995	0.997	0.999	1.000	0.935
0.125	0.010	0.591	0.831	0.923	0.961	0.979	0.988	0.993	0.996	0.998	1.000	0.923
0.150	0.010	0.555	0.802	0.905	0.950	0.972	0.984	0.990	0.995	0.998	1.000	0.921
0.175	0.010	0.523	0.775	0.887	0.939	0.965	0.979	0.987	0.993	0.997	1.000	0.914
0.200	0.010	0.496	0.750	0.870	0.928	0.958	0.974	0.984	0.991	0.996	1.000	0.903
0.250	0.010	0.450	0.705	0.837	0.905	0.943	0.964	0.978	0.987	0.994	1.000	0.896
0.300	0.010	0.413	0.665	0.805	0.883	0.927	0.954	0.971	0.983	0.992	1.000	0.885
0.350	0.010	0.383	0.630	0.776	0.861	0.911	0.942	0.963	0.978	0.990	1.000	0.875
0.400	0.010	0.358	0.599	0.748	0.839	0.895	0.931	0.956	0.973	0.987	1.000	0.865
0.500	0.010	0.318	0.547	0.700	0.799	0.865	0.909	0.940	0.963	0.983	1.000	0.849
0.600	0.010	0.288	0.504	0.658	0.763	0.836	0.887	0.924	0.953	0.978	1.000	0.833
0.700	0.010	0.265	0.470	0.622	0.731	0.809	0.866	0.909	0.944	0.973	1.000	0.820
0.800	0.010	0.245	0.440	0.590	0.701	0.784	0.846	0.895	0.934	0.968	1.000	0.808
1.000	0.010	0.216	0.394	0.538	0.651	0.740	0.810	0.868	0.916	0.959	1.000	0.786
1.250	0.010	0.190	0.351	0.488	0.602	0.695	0.773	0.839	0.897	0.949	1.000	0.765
1.500	0.010	0.172	0.320	0.451	0.563	0.659	0.742	0.814	0.880	0.941	1.000	0.749
1.750	0.010	0.158	0.297	0.422	0.532	0.630	0.716	0.794	0.866	0.934	1.000	0.734
2.000	0.010	0.147	0.279	0.399	0.508	0.606	0.696	0.778	0.855	0.928	1.000	0.722
2.500	0.010	0.133	0.252	0.366	0.472	0.571	0.664	0.752	0.837	0.919	1.000	0.705
3.000	0.010	0.123	0.236	0.344	0.448	0.548	0.643	0.735	0.825	0.913	1.000	0.694
3.500	0.010	0.117	0.225	0.330	0.432	0.532	0.629	0.724	0.817	0.909	1.000	0.686
4.000	0.010	0.113	0.217	0.320	0.422	0.521	0.619	0.715	0.811	0.906	1.000	0.680
5.000	0.010	0.108	0.208	0.309	0.409	0.508	0.607	0.706	0.804	0.902	1.000	0.674
6.000	0.010	0.106	0.204	0.303	0.403	0.502	0.602	0.701	0.801	0.900	1.000	0.671
7.000	0.010	0.105	0.202	0.301	0.400	0.500	0.599	0.699	0.799	0.900	1.000	0.669

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 20.000

FLOWRATE DISTRIBUTION

0.005	-0.485	-0.170	-0.051	-0.014	-0.003	-0.001	-0.000	0.0	0.0	0.0	0.0
0.010	-0.472	-0.176	-0.058	-0.020	-0.007	-0.002	-0.001	-0.000	0.0	0.0	0.0
0.015	-0.459	-0.181	-0.064	-0.024	-0.010	-0.004	-0.001	-0.000	-0.000	0.0	0.0
0.020	-0.448	-0.185	-0.070	-0.029	-0.012	-0.005	-0.002	-0.001	-0.000	-0.000	0.0
0.030	-0.427	-0.192	-0.080	-0.036	-0.017	-0.009	-0.004	-0.002	-0.001	-0.000	-0.000
0.040	-0.409	-0.197	-0.088	-0.042	-0.021	-0.011	-0.006	-0.003	-0.002	-0.001	-0.001
0.050	-0.394	-0.201	-0.095	-0.047	-0.025	-0.014	-0.008	-0.005	-0.003	-0.002	-0.001
0.060	-0.380	-0.204	-0.101	-0.052	-0.029	-0.017	-0.010	-0.006	-0.004	-0.003	-0.002
0.080	-0.356	-0.207	-0.110	-0.061	-0.036	-0.022	-0.014	-0.009	-0.006	-0.004	-0.004
0.100	-0.337	-0.208	-0.118	-0.068	-0.041	-0.026	-0.017	-0.012	-0.008	-0.006	-0.006
0.125	-0.317	-0.208	-0.125	-0.076	-0.048	-0.031	-0.021	-0.015	-0.011	-0.009	-0.008
0.150	-0.301	-0.207	-0.131	-0.082	-0.053	-0.036	-0.025	-0.018	-0.014	-0.011	-0.011
0.175	-0.287	-0.206	-0.135	-0.088	-0.058	-0.040	-0.028	-0.021	-0.016	-0.014	-0.013
0.200	-0.276	-0.203	-0.138	-0.092	-0.063	-0.044	-0.032	-0.024	-0.019	-0.016	-0.015
0.250	-0.257	-0.199	-0.142	-0.100	-0.070	-0.051	-0.038	-0.029	-0.024	-0.021	-0.020
0.300	-0.242	-0.194	-0.145	-0.105	-0.076	-0.057	-0.043	-0.034	-0.028	-0.025	-0.024
0.350	-0.230	-0.189	-0.146	-0.109	-0.081	-0.062	-0.048	-0.038	-0.032	-0.029	-0.028
0.400	-0.220	-0.185	-0.146	-0.112	-0.086	-0.066	-0.052	-0.042	-0.036	-0.032	-0.031
0.500	-0.204	-0.177	-0.145	-0.116	-0.092	-0.073	-0.059	-0.050	-0.043	-0.039	-0.038
0.600	-0.192	-0.170	-0.143	-0.118	-0.096	-0.079	-0.065	-0.056	-0.049	-0.045	-0.044
0.700	-0.182	-0.164	-0.141	-0.119	-0.099	-0.083	-0.070	-0.061	-0.054	-0.051	-0.050
0.800	-0.174	-0.158	-0.139	-0.119	-0.101	-0.086	-0.074	-0.065	-0.059	-0.056	-0.054
1.000	-0.161	-0.149	-0.134	-0.119	-0.104	-0.091	-0.081	-0.073	-0.067	-0.064	-0.063
1.250	-0.149	-0.141	-0.129	-0.117	-0.105	-0.095	-0.086	-0.079	-0.075	-0.072	-0.071
1.500	-0.141	-0.134	-0.125	-0.115	-0.106	-0.097	-0.090	-0.084	-0.080	-0.078	-0.077
1.750	-0.134	-0.128	-0.122	-0.114	-0.106	-0.099	-0.093	-0.088	-0.085	-0.083	-0.082
2.000	-0.129	-0.124	-0.119	-0.112	-0.106	-0.100	-0.095	-0.091	-0.088	-0.087	-0.086
2.500	-0.121	-0.118	-0.114	-0.110	-0.106	-0.102	-0.098	-0.096	-0.094	-0.092	-0.092
3.000	-0.116	-0.113	-0.111	-0.108	-0.105	-0.103	-0.100	-0.098	-0.097	-0.096	-0.096
3.500	-0.112	-0.111	-0.109	-0.107	-0.105	-0.103	-0.101	-0.100	-0.099	-0.099	-0.098
4.000	-0.110	-0.109	-0.107	-0.106	-0.105	-0.103	-0.102	-0.101	-0.101	-0.100	-0.100
5.000	-0.107	-0.106	-0.106	-0.105	-0.104	-0.104	-0.103	-0.103	-0.102	-0.102	-0.102
6.000	-0.106	-0.105	-0.105	-0.104	-0.104	-0.104	-0.104	-0.103	-0.103	-0.103	-0.103
7.000	-0.105	-0.104	-0.104	-0.104	-0.104	-0.104	-0.104	-0.104	-0.104	-0.104	-0.104

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.895	2.665	2.521	2.359

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 30.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.894	0.988	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.010	0.010	0.878	0.983	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.015	0.010	0.863	0.977	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.966
0.020	0.010	0.849	0.972	0.993	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.964
0.030	0.010	0.821	0.961	0.989	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.961
0.040	0.010	0.794	0.950	0.984	0.994	0.997	0.999	0.999	1.000	1.000	1.000	0.958
0.050	0.010	0.770	0.939	0.979	0.992	0.996	0.998	0.999	1.000	1.000	1.000	0.955
0.060	0.010	0.747	0.928	0.974	0.989	0.995	0.997	0.999	0.999	1.000	1.000	0.952
0.080	0.010	0.706	0.906	0.964	0.984	0.992	0.996	0.998	0.999	0.999	1.000	0.944
0.100	0.010	0.669	0.884	0.953	0.978	0.989	0.994	0.997	0.998	0.999	1.000	0.941
0.125	0.010	0.629	0.858	0.939	0.970	0.984	0.991	0.995	0.997	0.999	1.000	0.934
0.150	0.010	0.594	0.833	0.924	0.962	0.979	0.988	0.993	0.996	0.998	1.000	0.928
0.175	0.010	0.564	0.809	0.909	0.953	0.974	0.985	0.991	0.995	0.998	1.000	0.922
0.200	0.010	0.537	0.787	0.895	0.944	0.968	0.981	0.989	0.993	0.997	1.000	0.917
0.250	0.010	0.491	0.745	0.866	0.925	0.956	0.973	0.984	0.990	0.996	1.000	0.906
0.300	0.010	0.454	0.708	0.839	0.907	0.944	0.965	0.978	0.987	0.994	1.000	0.897
0.350	0.010	0.423	0.675	0.813	0.888	0.931	0.956	0.972	0.984	0.992	1.000	0.888
0.400	0.010	0.397	0.645	0.789	0.870	0.918	0.947	0.966	0.980	0.991	1.000	0.879
0.500	0.010	0.354	0.594	0.744	0.835	0.892	0.929	0.954	0.972	0.987	1.000	0.864
0.600	0.010	0.322	0.551	0.704	0.803	0.867	0.910	0.941	0.964	0.983	1.000	0.850
0.700	0.010	0.296	0.516	0.669	0.773	0.843	0.893	0.928	0.956	0.979	1.000	0.837
0.800	0.010	0.275	0.485	0.638	0.745	0.821	0.875	0.916	0.948	0.975	1.000	0.826
1.000	0.010	0.243	0.436	0.585	0.697	0.780	0.843	0.892	0.932	0.967	1.000	0.806
1.250	0.010	0.214	0.390	0.533	0.647	0.736	0.807	0.865	0.914	0.958	1.000	0.785
1.500	0.010	0.193	0.356	0.493	0.606	0.699	0.776	0.841	0.898	0.950	1.000	0.767
1.750	0.010	0.177	0.329	0.461	0.573	0.669	0.750	0.821	0.884	0.943	1.000	0.752
2.000	0.010	0.164	0.308	0.435	0.546	0.643	0.728	0.803	0.872	0.937	1.000	0.740
2.500	0.010	0.146	0.276	0.396	0.505	0.603	0.693	0.775	0.853	0.927	1.000	0.721
3.000	0.010	0.135	0.255	0.369	0.476	0.575	0.668	0.755	0.839	0.920	1.000	0.707
3.500	0.010	0.126	0.241	0.351	0.455	0.554	0.649	0.742	0.828	0.915	1.000	0.697
4.000	0.010	0.121	0.230	0.337	0.440	0.540	0.636	0.729	0.821	0.911	1.000	0.690
5.000	0.010	0.113	0.217	0.320	0.421	0.521	0.619	0.715	0.811	0.905	1.000	0.683
6.000	0.010	0.109	0.210	0.311	0.411	0.511	0.609	0.707	0.805	0.903	1.000	0.675
7.000	0.010	0.107	0.206	0.306	0.406	0.505	0.604	0.703	0.802	0.901	1.000	0.672

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 30.000

FLOWRATE DISTRIBUTION

0.005	-0.397	-0.140	-0.042	-0.012	-0.003	-0.001	-0.000	0.0	0.0	0.0	0.0
0.010	-0.388	-0.144	-0.047	-0.016	-0.005	-0.002	-0.000	-0.000	0.0	0.0	0.0
0.015	-0.379	-0.147	-0.052	-0.019	-0.008	-0.003	-0.001	-0.000	-0.000	0.0	0.0
0.020	-0.371	-0.151	-0.056	-0.022	-0.010	-0.004	-0.002	-0.001	-0.000	-0.000	0.0
0.030	-0.357	-0.156	-0.063	-0.027	-0.013	-0.006	-0.003	-0.002	-0.001	-0.000	-0.000
0.040	-0.344	-0.160	-0.069	-0.032	-0.016	-0.009	-0.005	-0.002	-0.001	-0.001	-0.001
0.050	-0.332	-0.163	-0.074	-0.036	-0.019	-0.011	-0.006	-0.003	-0.002	-0.001	-0.001
0.060	-0.322	-0.165	-0.078	-0.040	-0.022	-0.012	-0.007	-0.004	-0.003	-0.002	-0.002
0.080	-0.304	-0.169	-0.086	-0.046	-0.026	-0.016	-0.010	-0.006	-0.004	-0.003	-0.003
0.100	-0.289	-0.170	-0.092	-0.052	-0.031	-0.019	-0.012	-0.008	-0.006	-0.005	-0.004
0.125	-0.273	-0.171	-0.098	-0.058	-0.036	-0.023	-0.015	-0.011	-0.008	-0.006	-0.006
0.150	-0.260	-0.171	-0.103	-0.063	-0.040	-0.026	-0.018	-0.013	-0.010	-0.009	-0.008
0.175	-0.249	-0.171	-0.107	-0.067	-0.044	-0.029	-0.021	-0.015	-0.012	-0.010	-0.009
0.200	-0.240	-0.170	-0.110	-0.071	-0.047	-0.032	-0.023	-0.017	-0.013	-0.011	-0.011
0.250	-0.224	-0.167	-0.114	-0.077	-0.053	-0.038	-0.028	-0.021	-0.017	-0.015	-0.014
0.300	-0.211	-0.164	-0.117	-0.082	-0.058	-0.042	-0.032	-0.025	-0.020	-0.018	-0.017
0.350	-0.201	-0.160	-0.119	-0.086	-0.062	-0.046	-0.035	-0.028	-0.023	-0.020	-0.020
0.400	-0.192	-0.157	-0.120	-0.089	-0.066	-0.050	-0.039	-0.031	-0.026	-0.023	-0.022
0.500	-0.179	-0.151	-0.120	-0.093	-0.071	-0.056	-0.044	-0.036	-0.031	-0.028	-0.027
0.600	-0.168	-0.146	-0.120	-0.095	-0.076	-0.060	-0.049	-0.041	-0.036	-0.033	-0.032
0.700	-0.160	-0.141	-0.119	-0.097	-0.079	-0.064	-0.053	-0.045	-0.040	-0.037	-0.036
0.800	-0.153	-0.137	-0.117	-0.098	-0.081	-0.067	-0.057	-0.049	-0.044	-0.041	-0.040
1.000	-0.141	-0.129	-0.114	-0.098	-0.084	-0.072	-0.062	-0.055	-0.050	-0.047	-0.046
1.250	-0.131	-0.122	-0.110	-0.098	-0.086	-0.076	-0.067	-0.061	-0.056	-0.054	-0.053
1.500	-0.123	-0.116	-0.107	-0.097	-0.087	-0.078	-0.071	-0.065	-0.062	-0.059	-0.058
1.750	-0.117	-0.112	-0.104	-0.096	-0.087	-0.080	-0.074	-0.069	-0.066	-0.064	-0.063
2.000	-0.113	-0.108	-0.102	-0.095	-0.088	-0.081	-0.076	-0.072	-0.069	-0.067	-0.066
2.500	-0.105	-0.102	-0.097	-0.093	-0.088	-0.083	-0.079	-0.076	-0.074	-0.072	-0.072
3.000	-0.100	-0.098	-0.094	-0.091	-0.087	-0.084	-0.081	-0.079	-0.077	-0.076	-0.076
3.500	-0.097	-0.095	-0.092	-0.090	-0.087	-0.085	-0.082	-0.081	-0.080	-0.079	-0.079
4.000	-0.094	-0.092	-0.091	-0.089	-0.087	-0.085	-0.083	-0.082	-0.081	-0.081	-0.081
5.000	-0.090	-0.089	-0.088	-0.087	-0.086	-0.085	-0.085	-0.084	-0.083	-0.082	-0.082
6.000	-0.089	-0.088	-0.087	-0.087	-0.086	-0.086	-0.085	-0.085	-0.085	-0.084	-0.084
7.000	-0.088	-0.087	-0.087	-0.086	-0.086	-0.086	-0.086	-0.085	-0.085	-0.085	-0.085

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.930	2.725	2.602	2.536

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 40.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.895	0.988	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.010	0.010	0.881	0.983	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.015	0.010	0.868	0.979	0.995	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.020	0.010	0.855	0.974	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.965
0.030	0.010	0.830	0.965	0.990	0.997	0.999	0.999	1.000	1.000	1.000	1.000	0.962
0.040	0.010	0.807	0.955	0.986	0.995	0.998	0.999	1.000	1.000	1.000	1.000	0.959
0.050	0.010	0.785	0.946	0.982	0.993	0.997	0.999	0.999	1.000	1.000	1.000	0.957
0.060	0.010	0.764	0.936	0.978	0.991	0.996	0.998	0.999	0.999	1.000	1.000	0.954
0.080	0.010	0.726	0.917	0.969	0.987	0.993	0.997	0.998	0.999	1.000	1.000	0.949
0.100	0.010	0.692	0.898	0.960	0.982	0.991	0.995	0.997	0.998	0.999	1.000	0.944
0.125	0.010	0.654	0.875	0.948	0.975	0.987	0.993	0.996	0.998	0.999	1.000	0.939
0.150	0.010	0.621	0.852	0.935	0.968	0.983	0.990	0.994	0.997	0.999	1.000	0.932
0.175	0.010	0.592	0.831	0.923	0.961	0.978	0.987	0.993	0.996	0.998	1.000	0.927
0.200	0.010	0.565	0.810	0.910	0.953	0.974	0.985	0.991	0.995	0.998	1.000	0.922
0.250	0.010	0.520	0.772	0.885	0.938	0.964	0.978	0.987	0.992	0.996	1.000	0.913
0.300	0.010	0.483	0.737	0.861	0.921	0.953	0.971	0.982	0.990	0.995	1.000	0.904
0.350	0.010	0.451	0.706	0.837	0.905	0.942	0.964	0.978	0.987	0.994	1.000	0.896
0.400	0.010	0.425	0.677	0.815	0.889	0.931	0.957	0.973	0.984	0.992	1.000	0.888
0.500	0.010	0.381	0.627	0.773	0.858	0.909	0.941	0.962	0.977	0.989	1.000	0.874
0.600	0.010	0.348	0.585	0.735	0.828	0.887	0.925	0.951	0.970	0.986	1.000	0.861
0.700	0.010	0.320	0.549	0.701	0.801	0.865	0.909	0.940	0.964	0.983	1.000	0.849
0.800	0.010	0.298	0.518	0.671	0.775	0.845	0.894	0.929	0.956	0.979	1.000	0.838
1.000	0.010	0.263	0.467	0.619	0.728	0.806	0.864	0.908	0.943	0.972	1.000	0.819
1.250	0.010	0.232	0.419	0.567	0.679	0.764	0.830	0.883	0.926	0.954	1.000	0.798
1.500	0.010	0.209	0.383	0.525	0.638	0.728	0.800	0.860	0.911	0.957	1.000	0.781
1.750	0.010	0.192	0.354	0.491	0.604	0.697	0.774	0.840	0.897	0.950	1.000	0.764
2.000	0.010	0.178	0.331	0.463	0.576	0.671	0.752	0.822	0.885	0.944	1.000	0.754
2.500	0.010	0.158	0.296	0.421	0.531	0.628	0.715	0.793	0.865	0.934	1.000	0.733
3.000	0.010	0.144	0.272	0.391	0.499	0.597	0.687	0.771	0.850	0.926	1.000	0.719
3.500	0.010	0.134	0.255	0.369	0.475	0.574	0.667	0.754	0.838	0.920	1.000	0.707
4.000	0.010	0.127	0.242	0.352	0.457	0.556	0.651	0.741	0.829	0.915	1.000	0.698
5.000	0.010	0.118	0.226	0.331	0.433	0.533	0.629	0.724	0.817	0.910	1.000	0.684
6.000	0.010	0.113	0.216	0.319	0.419	0.519	0.617	0.714	0.810	0.905	1.000	0.679
7.000	0.010	0.110	0.211	0.311	0.411	0.511	0.610	0.708	0.805	0.903	1.000	0.675

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 40.000

FLOWRATE DISTRIBUTION

0.005	-0.344	-0.122	-0.037	-0.010	-0.002	-0.001	-0.000	0.0	0.0	0.0	0.0
0.010	-0.337	-0.125	-0.041	-0.014	-0.005	-0.002	-0.000	-0.000	0.0	0.0	0.0
0.015	-0.331	-0.127	-0.044	-0.016	-0.006	-0.003	-0.001	-0.000	-0.000	0.0	0.0
0.020	-0.325	-0.130	-0.047	-0.019	-0.008	-0.003	-0.002	-0.001	-0.000	-0.000	0.0
0.030	-0.313	-0.134	-0.053	-0.023	-0.011	-0.005	-0.003	-0.001	-0.001	-0.000	-0.000
0.040	-0.303	-0.137	-0.058	-0.026	-0.013	-0.007	-0.004	-0.002	-0.001	-0.001	-0.000
0.050	-0.294	-0.140	-0.062	-0.030	-0.015	-0.009	-0.005	-0.003	-0.002	-0.001	-0.001
0.060	-0.286	-0.142	-0.065	-0.033	-0.018	-0.010	-0.006	-0.004	-0.002	-0.001	-0.001
0.080	-0.271	-0.145	-0.072	-0.038	-0.021	-0.013	-0.008	-0.005	-0.003	-0.002	-0.002
0.100	-0.259	-0.147	-0.077	-0.042	-0.025	-0.015	-0.010	-0.007	-0.005	-0.004	-0.003
0.125	-0.246	-0.149	-0.082	-0.047	-0.029	-0.018	-0.012	-0.008	-0.006	-0.005	-0.005
0.150	-0.234	-0.149	-0.087	-0.052	-0.032	-0.021	-0.014	-0.010	-0.008	-0.006	-0.006
0.175	-0.225	-0.149	-0.090	-0.055	-0.035	-0.024	-0.016	-0.012	-0.009	-0.008	-0.007
0.200	-0.217	-0.148	-0.093	-0.059	-0.038	-0.026	-0.018	-0.013	-0.011	-0.009	-0.008
0.250	-0.203	-0.147	-0.097	-0.064	-0.043	-0.030	-0.022	-0.017	-0.013	-0.011	-0.011
0.300	-0.192	-0.145	-0.100	-0.068	-0.048	-0.034	-0.025	-0.019	-0.016	-0.014	-0.013
0.350	-0.183	-0.142	-0.102	-0.072	-0.051	-0.037	-0.028	-0.022	-0.018	-0.016	-0.015
0.400	-0.175	-0.140	-0.103	-0.075	-0.054	-0.040	-0.031	-0.025	-0.020	-0.018	-0.018
0.500	-0.163	-0.135	-0.105	-0.079	-0.059	-0.046	-0.036	-0.029	-0.025	-0.022	-0.021
0.600	-0.153	-0.131	-0.105	-0.082	-0.063	-0.050	-0.040	-0.033	-0.028	-0.026	-0.025
0.700	-0.145	-0.127	-0.104	-0.083	-0.066	-0.053	-0.043	-0.037	-0.032	-0.029	-0.028
0.800	-0.139	-0.123	-0.103	-0.084	-0.069	-0.056	-0.046	-0.040	-0.035	-0.032	-0.032
1.000	-0.129	-0.117	-0.101	-0.085	-0.072	-0.060	-0.051	-0.045	-0.040	-0.038	-0.037
1.250	-0.120	-0.110	-0.098	-0.086	-0.074	-0.064	-0.056	-0.050	-0.046	-0.044	-0.043
1.500	-0.113	-0.105	-0.096	-0.085	-0.075	-0.067	-0.060	-0.054	-0.050	-0.048	-0.048
1.750	-0.107	-0.101	-0.093	-0.084	-0.076	-0.069	-0.062	-0.058	-0.054	-0.052	-0.051
2.000	-0.102	-0.097	-0.091	-0.083	-0.076	-0.070	-0.064	-0.060	-0.057	-0.055	-0.055
2.500	-0.096	-0.092	-0.087	-0.082	-0.076	-0.072	-0.067	-0.064	-0.062	-0.060	-0.060
3.000	-0.091	-0.088	-0.084	-0.080	-0.076	-0.073	-0.070	-0.067	-0.065	-0.064	-0.064
3.500	-0.087	-0.085	-0.082	-0.079	-0.076	-0.073	-0.071	-0.069	-0.068	-0.067	-0.066
4.000	-0.084	-0.083	-0.081	-0.078	-0.076	-0.074	-0.072	-0.070	-0.069	-0.069	-0.069
5.000	-0.081	-0.079	-0.078	-0.077	-0.076	-0.074	-0.073	-0.072	-0.072	-0.071	-0.071
6.000	-0.078	-0.078	-0.077	-0.076	-0.075	-0.075	-0.074	-0.073	-0.073	-0.073	-0.073
7.000	-0.077	-0.077	-0.076	-0.076	-0.075	-0.075	-0.074	-0.074	-0.074	-0.074	-0.074

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.950	2.762	2.643	2.623

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 50.000

PRESSURE SQUARED DISTRIBUTION

TIME (TD)	DISTANCE(X)= 0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	PMEAN (PM)
0.005	0.010	0.895	0.988	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970
0.010	0.010	0.883	0.984	0.997	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.968
0.015	0.010	0.871	0.980	0.996	0.999	1.000	1.000	1.000	1.000	1.000	1.000	0.967
0.020	0.010	0.859	0.976	0.994	0.998	0.999	1.000	1.000	1.000	1.000	1.000	0.966
0.030	0.010	0.837	0.967	0.991	0.997	0.999	1.000	1.000	1.000	1.000	1.000	0.963
0.040	0.010	0.816	0.959	0.988	0.996	0.998	0.999	1.000	1.000	1.000	1.000	0.960
0.050	0.010	0.795	0.950	0.984	0.994	0.997	0.999	0.999	1.000	1.000	1.000	0.958
0.060	0.010	0.776	0.942	0.981	0.992	0.996	0.998	0.999	1.000	1.000	1.000	0.954
0.080	0.010	0.741	0.925	0.973	0.988	0.994	0.997	0.998	0.999	1.000	1.000	0.951
0.100	0.010	0.709	0.907	0.965	0.984	0.992	0.996	0.998	0.999	0.999	1.000	0.946
0.125	0.010	0.673	0.887	0.954	0.978	0.989	0.994	0.996	0.998	0.999	1.000	0.941
0.150	0.010	0.641	0.866	0.943	0.972	0.985	0.992	0.995	0.997	0.999	1.000	0.936
0.175	0.010	0.613	0.846	0.932	0.966	0.982	0.989	0.994	0.996	0.998	1.000	0.931
0.200	0.010	0.587	0.827	0.920	0.959	0.978	0.987	0.992	0.996	0.998	1.000	0.927
0.250	0.010	0.543	0.792	0.898	0.946	0.969	0.981	0.989	0.994	0.997	1.000	0.918
0.300	0.010	0.505	0.759	0.876	0.931	0.960	0.976	0.985	0.991	0.996	1.000	0.910
0.350	0.010	0.474	0.728	0.854	0.917	0.950	0.969	0.981	0.989	0.995	1.000	0.902
0.400	0.010	0.447	0.701	0.833	0.903	0.941	0.963	0.977	0.986	0.994	1.000	0.895
0.500	0.010	0.403	0.652	0.794	0.874	0.921	0.949	0.968	0.981	0.991	1.000	0.881
0.600	0.010	0.368	0.610	0.758	0.847	0.901	0.935	0.958	0.975	0.988	1.000	0.868
0.700	0.010	0.340	0.575	0.726	0.821	0.881	0.921	0.948	0.969	0.985	1.000	0.858
0.800	0.010	0.317	0.544	0.696	0.796	0.862	0.907	0.938	0.962	0.982	1.000	0.847
1.000	0.010	0.280	0.492	0.645	0.752	0.826	0.879	0.919	0.950	0.976	1.000	0.829
1.250	0.010	0.248	0.443	0.593	0.704	0.786	0.847	0.895	0.935	0.968	1.000	[illegible]
1.500	0.010	0.223	0.405	0.550	0.663	0.750	0.819	0.874	0.920	0.961	1.000	0.792
1.750	0.010	0.205	0.375	0.515	0.629	0.720	0.793	0.854	0.907	0.955	1.000	0.777
2.000	0.010	0.190	0.350	0.487	0.600	0.693	0.771	0.837	0.895	0.949	1.000	0.764
2.500	0.010	0.168	0.313	0.442	0.553	0.649	0.733	0.808	0.875	0.939	1.000	0.744
3.000	0.010	0.153	0.287	0.409	0.518	0.616	0.704	0.785	0.859	0.931	1.000	0.722
3.500	0.010	0.142	0.268	0.385	0.492	0.591	0.682	0.766	0.847	0.924	1.000	0.715
4.000	0.010	0.134	0.253	0.366	0.472	0.571	0.664	0.752	0.837	0.919	1.000	0.706
5.000	0.010	0.123	0.234	0.341	0.444	0.544	0.640	0.732	0.823	0.912	1.000	0.692
6.000	0.010	0.116	0.222	0.326	0.428	0.527	0.624	0.720	0.814	0.907	1.000	0.684
7.000	0.010	0.112	0.215	0.317	0.418	0.517	0.615	0.712	0.808	0.904	1.000	0.678

SLIP COEFF(B)= 0.400 INERTIAL COEFF(BB)= 50.000

FLOWRATE DISTRIBUTION

0.005	-0.308	-0.109	-0.034	-0.010	-0.002	-0.000	-0.000	0.0	0.0	0.0	0.0
0.010	-0.302	-0.112	-0.037	-0.012	-0.004	-0.001	-0.000	-0.000	0.0	0.0	0.0
0.015	-0.297	-0.114	-0.039	-0.014	-0.006	-0.002	-0.001	-0.000	-0.000	0.0	0.0
0.020	-0.292	-0.116	-0.042	-0.016	-0.007	-0.003	-0.001	-0.001	-0.000	-0.000	0.0
0.030	-0.283	-0.119	-0.046	-0.020	-0.009	-0.005	-0.002	-0.001	-0.001	-0.000	-0.000
0.040	-0.275	-0.122	-0.050	-0.023	-0.011	-0.006	-0.003	-0.002	-0.001	-0.001	-0.000
0.050	-0.267	-0.125	-0.054	-0.025	-0.013	-0.007	-0.004	-0.002	-0.001	-0.001	-0.001
0.060	-0.260	-0.127	-0.057	-0.028	-0.015	-0.008	-0.005	-0.003	-0.002	-0.001	-0.001
0.080	-0.248	-0.129	-0.062	-0.032	-0.018	-0.011	-0.007	-0.004	-0.003	-0.002	-0.002
0.100	-0.237	-0.131	-0.067	-0.036	-0.021	-0.013	-0.008	-0.006	-0.004	-0.003	-0.003
0.125	-0.226	-0.133	-0.072	-0.040	-0.024	-0.015	-0.010	-0.007	-0.005	-0.004	-0.004
0.150	-0.216	-0.133	-0.076	-0.044	-0.027	-0.018	-0.012	-0.008	-0.006	-0.005	-0.005
0.175	-0.207	-0.134	-0.079	-0.047	-0.030	-0.020	-0.014	-0.010	-0.008	-0.006	-0.006
0.200	-0.200	-0.133	-0.082	-0.050	-0.032	-0.022	-0.015	-0.011	-0.009	-0.007	-0.007
0.250	-0.188	-0.132	-0.086	-0.055	-0.037	-0.025	-0.018	-0.014	-0.011	-0.009	-0.009
0.300	-0.178	-0.131	-0.088	-0.059	-0.041	-0.029	-0.021	-0.016	-0.013	-0.011	-0.011
0.350	-0.169	-0.129	-0.090	-0.062	-0.044	-0.032	-0.024	-0.018	-0.015	-0.013	-0.013
0.400	-0.162	-0.127	-0.092	-0.065	-0.047	-0.034	-0.026	-0.020	-0.017	-0.015	-0.014
0.500	-0.151	-0.123	-0.093	-0.069	-0.051	-0.039	-0.030	-0.024	-0.021	-0.018	-0.018
0.600	-0.142	-0.120	-0.094	-0.072	-0.055	-0.043	-0.034	-0.028	-0.024	-0.022	-0.021
0.700	-0.135	-0.116	-0.094	-0.074	-0.058	-0.046	-0.037	-0.031	-0.027	-0.024	-0.024
0.800	-0.129	-0.113	-0.093	-0.075	-0.060	-0.048	-0.040	-0.034	-0.029	-0.027	-0.026
1.000	-0.120	-0.108	-0.092	-0.076	-0.063	-0.052	-0.044	-0.038	-0.034	-0.032	-0.031
1.250	-0.111	-0.102	-0.090	-0.077	-0.066	-0.056	-0.049	-0.043	-0.039	-0.037	-0.036
1.500	-0.105	-0.097	-0.087	-0.077	-0.067	-0.059	-0.052	-0.047	-0.043	-0.041	-0.040
1.750	-0.100	-0.093	-0.085	-0.076	-0.068	-0.060	-0.054	-0.050	-0.046	-0.045	-0.044
2.000	-0.095	-0.090	-0.083	-0.076	-0.068	-0.062	-0.056	-0.052	-0.049	-0.048	-0.047
2.500	-0.089	-0.085	-0.080	-0.074	-0.069	-0.064	-0.059	-0.056	-0.054	-0.052	-0.052
3.000	-0.084	-0.081	-0.077	-0.073	-0.069	-0.065	-0.061	-0.059	-0.057	-0.056	-0.055
3.500	-0.080	-0.078	-0.075	-0.072	-0.069	-0.066	-0.063	-0.061	-0.059	-0.058	-0.058
4.000	-0.078	-0.076	-0.074	-0.071	-0.068	-0.066	-0.064	-0.062	-0.061	-0.060	-0.060
5.000	-0.074	-0.073	-0.071	-0.070	-0.068	-0.067	-0.065	-0.064	-0.064	-0.063	-0.063
6.000	-0.072	-0.071	-0.070	-0.069	-0.068	-0.067	-0.066	-0.065	-0.065	-0.065	-0.065
7.000	-0.070	-0.069	-0.069	-0.068	-0.068	-0.067	-0.067	-0.066	-0.066	-0.066	-0.066

MATERIAL BALANCE CALCULATIONS-% ERROR

TD=	0.050	0.250	1.000	3.000
	2.964	2.788	2.669	2.674